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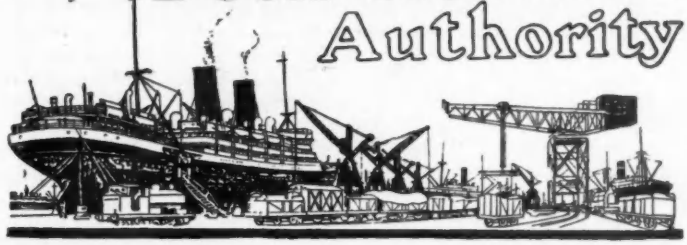
The Dock & Harbour Authority



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Editorial Comments

The Port of Wellington.

Wellington, since 1865 the capital and premier commercial city of the Dominion of New Zealand, was founded in 1840, and to-day has a population of more than 150,000. Situated on the south-west of North Island, on the shores of Port Nicholson, Wellington is favoured with a safe and commodious harbour and owes its commercial prosperity to its convenient and central position.

Previous to 1840, and the arrival of the first immigrants, the history of Wellington was uneventful. In 1773, Captain James Cook, in his ship *Resolution*, anchored off the entrance to the harbour but did not enter it. The locality was again visited in 1826, when Captain James Herd called at the harbour in the barque *Rosanna*, and, in 1839, Colonel Wakefield arrived in the *Tory* to carry out the colonising plans of the New Zealand Company formed in Great Britain for that purpose.

Originally, the immediate surroundings of Wellington were very uninviting, as it is walled by high mountain ranges unsuitable for tillage, but great enterprise has been shown in the construction of roads to the more fertile regions, and railways have been built towards both the north and north-east.

Previous descriptions of the Port of Wellington have appeared in this Journal in the issues of April 1923 and May 1927, and for the latest account of the history and development of the port, we are indebted to the Wellington Harbour Board, who have kindly supplied the details which will be found on a following page.

In view of the recent nationalisation of the ports in the United Kingdom, it is interesting to note that, although for many years past New Zealand has been administered by a Labour Government, the ports of the country are not controlled by a central authority, but each has its own Board of Control, with clearly defined functions. The boards determine and carry out such policies of harbour development and management as they consider advisable. They have direct financial responsibility and also control delivery of goods to consignees. Government approval has to be obtained, however, for all works involving reclamations or wharf construction.

Port Congestion and Shipping Delays.

The problem of dock and quayside congestion and of consequent shipping delays has been a subject receiving much attention in the press during recent months. It also has been frequently referred to in these columns. The matter has again been given prominence by the publication of an Interim Report of the Working Party appointed by the Minister of Transport to investigate the causes of delay at Liverpool and Birkenhead Docks. This report, which was published early last month, was issued by the Mersey Docks & Harbour Board at the request of the Minister, and an abstract containing details of general interest will be found elsewhere in this issue.

With regard to the findings and recommendations contained in the Report, it is obvious that the problems and difficulties to be found at Liverpool and Birkenhead have received most careful examination by the Working Party, but most of their findings were already known, and they have been unable to suggest any radical measures for improving the position.

There is no question that, owing to the damage done to the Liverpool docks during the war, and the consequent repairs which have had to be effected, working arrangements have, at times, been difficult; but after making due allowance for adverse physical conditions, the fact remains that, in the opinion of the investigating committee, the dockers are not making a serious effort to speed up cargo handling so as to relieve congestion. It is pointed out in the report that the present day rate of loading averages about 6.9 tons per gang hour, whereas the pre-war figure has been assessed at not less than 9 tons per gang hour. These figures speak for themselves and show all too clearly that the chief problem to be solved is that of persuading the men to give of their best. This aspect of the matter has been brought to the notice of the Dock Labour Joint Committee and the Dock Labour Board, and the outcome will be watched with interest by all those concerned in promoting greater efficiency throughout the industry.

The Dock and Harbour Authorities' Association.

The Annual Report of the Dock and Harbour Authorities' Association for the year ended 31st December, 1947, was issued in the middle of February last, and, unfortunately, owing to lack of space in this Journal, due to the prevailing paper restrictions, reference to the several matters discussed had to be deferred until this month. There were, however, two subjects of outstanding importance to many conservancy and harbour authorities in this country. The first deals with the prevention of pollution in rivers, and the second with the problem of damage caused by mining subsidence.

The Association's Memorandum of Evidence, an extract of which will be found on another page, explains the attitude of the Association in regard to the River Boards Bill, which is still before Parliament. With regard to the statement in the Memorandum, saying "the discharge of trade effluents, more particularly into tidal rivers, may be an economic necessity," Lord Saltoun, at the annual meeting, stated that he thought this was a very unfortunate expression, as " it is precisely on this question of economic necessity, and under the protection of the 1876 Act, that every

Editorial Comments—continued

water in this country has been polluted, and, because of that economic necessity, every great water undertaking in our country to-day has to spend enormous sums of money in trying to intercept the objectionable matter before it is able to pollute the stream flow. As a result of this economic necessity, an enormous economic liability has been imposed on the country." Obviously, until some more effective means is instituted for dealing with the evil of river pollution, the subject must continue to engage the careful attention of the Association.

The problem of damage caused to port and dock structures and installations by mining subsidence is another subject of particular importance to ports in coal mining areas, especially in view of the nationalisation of the coal mining industry.

Coal and Oil Bunker Costs.

Although the recent increases in the amount of coal to be made available for bunkering and bunker depots abroad is an encouraging feature of the improving coal production figures for this country, at the same time, concern is being freely expressed in shipping circles and among port officials at the alarming increases in the prices of both coal and oil for bunkers.

With regard to oil, it was stated in Parliament a few weeks ago that the position is viewed with apprehension. Apparently the increase in the world demand for oil is largely due to conversion from coal burning to oil burning, not only in this country but throughout the world, and one of the chief difficulties at present is that of finding sufficient tanker tonnage for oil transportation. This shortage of tankers has made it necessary for the Ministry of Fuel and Power to set up a working party comprising representatives of that Ministry, the Ministry of Transport, the Chamber of Shipping of the United Kingdom, and the oil industry, to study the whole question.

The seriousness of the position certainly has not been alleviated by the announcement made by the Ministry of Fuel and Power within the last few weeks, that, owing to higher world oil prices, it had become necessary to increase again the prices of all bunker oils by an appreciable amount.

The same price difficulty is being experienced in regard to coal bunkers, and numerous protests have been made at the heavy increase in cost. These are causing much dissatisfaction in many parts of Europe, and, although from a short-term view, owing to the prevailing seller's market, this country can sell every ton of coal produced, from a long-term view the excessive rates now being charged by the National Coal Board are likely to impede future transactions with our European customers. This aspect of the matter is of special importance to the ports of South Wales, whose existence depends to a large extent upon a high level of coal exports.

The present unsatisfactory position was aptly summed up by the Glasgow and Clyde Ship-Owners' Association at their Annual General Meeting, held on 17th February last. Commenting on the coal situation in their Annual Report, the directors pointed out that this country's exports cannot flourish unless coal can be produced at an economic price. " A very serious position has resulted from the recent increase in the price of bunkers, and this is bound to have a far reaching effect on trade in general. With such a large increase in the price of coal, our exports are bound to suffer, as it is difficult to see how our manufacturers are going to compete with other countries. Coal is one of our outstanding exports, and it is up to the Government to see that such a great asset is in no way prejudiced by unnecessary controls."

Canal Reorganisation and Betterment.

Sir Reginald Hill, chairman of the Docks & Inland Waterways Executive of the British Transport Commission, has indicated that the approach of the Transport Board to the operation and development of British Canals and Waterways under the Transport Act will be on sound and cautious lines. Speaking at Liverpool recently, when he inspected a section of the Leeds and Liverpool Canal, he announced the policy of this Board as that of seeking to knit British Waterways into " something like a cohesive whole." He disclaimed, however, any intention of running the whole system from some central point, which he said " would be quite fatal." On the contrary, the intention of the Board was to leave the day to day management of the waterways in the hands of local managers and agents, who are the most competent persons to deal with it. This is an admirable decision, since it is obvious that local problems and difficulties can best be solved by the man on the spot and not by some higher official at some central point, miles away from the locality of the trouble. It is to be hoped that the Board will continue to act on so admirable a principle.

International Conference on Safety of Life at Sea.

The Ministry of Transport has announced that the International Conference on Safety of Life at Sea will open in London on the 23rd of this month, and will probably last from six to eight weeks. Between 300 and 400 delegates from 30 nations are expected to attend, and the delegation which is to represent the United Kingdom has already held a preliminary meeting under the chairmanship of the Rt. Hon. Sir John Anderson, M.P., Chairman of the Port of London Authority.

The purpose of the Conference is to revise and bring up to date, in the light of experience gained over the last 20 years and particularly during the recent war, the provisions of the 1929 Conference. One of the main questions that will come under consideration will be that of international regulations for preventing collisions at sea.

Some months ago the various Governments that are parties to the Safety Convention were asked to notify the British Government of any proposals they wished to make for the amendment of the Convention and of the collision regulations. These proposals have been received and the British Government, acting as the convening Government and as the Bureau set up at the last Conference, duly arranged for the circulation of the proposals to all the countries attending the Conference, so that consideration could be given to them prior to the opening of the Meetings in London.

The proposals to be submitted by the United Kingdom delegation will include suggestions as to the way international co-operation can best be secured in several matters, including assistance in distress, routing of distress messages, radio communications, radio aids to navigation, and weather reports. In each of these cases, the delegation will recommend a method by which necessary co-ordination in the different fields can be achieved.

It is to be hoped that complete success will attend the conference in its deliberations and that all schemes for closer co-operation among maritime countries will be mutually agreed and implemented, as any changes in the existing regulations will be jeopardised if there be any dissentients.

The Development of Polish Ports.

The difficulties confronting the Polish authorities in the rebuilding of their ports were outlined early last month by two Polish port officials, who have been visiting the United Kingdom to study conditions and equipment at British ports.

In a statement to the press, the representatives said it is hoped that within the next few years the turnover at Polish ports will exceed 20,000,000 tons a year. In 1938, the annual turnover of Gdynia and Gdansk combined was 16,000,000 tons; in 1945, by reason of the destruction and damage caused by the Germans, the trade of all Polish ports did not exceed 700,000 tons, but this rose in 1946 to 7,000,000 tons, and last year to about 11,000,000 tons. The total turnover for 1948 is expected to be about 18½ million tons.

The main turnover is concentrated in Gdynia and Gdansk, and although these two ports are being further developed, it is obvious that they will not be able to handle all the Polish and transit trade. Last year, therefore, a plan for the reconstruction of the port of Szczecin was agreed, and new docks, quays and warehouses are now under construction, and it is hoped that by 1950 at least 7,000,000 tons of goods will be handled by the port.

The main problem of all Polish ports is a shortage of technical equipment, such as cranes and conveyors. Much of this equipment will be constructed in Poland, but some orders have already been placed abroad and a number of ready-made installations purchased, and it is hoped the deficiencies will speedily be made good.

The Port of Wellington, New Zealand

A Commodious Harbour with Modern Port Facilities

View of Harbour and City Wharves.

WELLINGTON HARBOUR, or, as it is still occasionally called, Port Nicholson, contains an area of about 20,000 acres, having depths varying from six to fourteen fathoms, and of sufficient capacity to enable the whole British Fleet to be safely accommodated within its limits. The anchorage is good throughout, and the harbour, being land locked, provides safe shelter. The entrance to this magnificent sheet of water is ample, exceeding in its narrowest part, 3,600 feet, and having a depth varying from 7 to 8 fathoms, with a deep-water channel 1,000 feet wide entering into the harbour. The current in the entrance never exceeds 2 knots, and the rise and fall of the tide varies from 2 feet 6 inches to 4 feet 6 inches.

The boundary between Cook Strait and Port Nicholson (limits of the port), as defined by Order-in-Council contained in the New Zealand Gazette of 23rd November, 1868, is an arc of a circle having a radius of three nautical miles, with its centre at Outer Rock of Barret Reef and extending from approximately the centre of Fitzroy Bay on the eastern side of the harbour entrance to the western extremity of Island Bay on the opposite side. The foreshore within these harbour limits extends for approximately 41 miles.

Possessed of every natural advantage in its large and sheltered area, easy access, and sufficient but not excessive depth of water, the harbour of Wellington is the most favoured in the Dominion, and these facts, added to its central geographical position on the waterway between the North and South Islands, united with the splendid accommodation and facilities afforded to shipping, combine to make it the chief distributing port of New Zealand. Being the nearest port in New Zealand and Australia to Panama, it is a convenient port of call for overseas vessels passing through the Panama Canal for or from the United Kingdom, Europe, America and Canada.

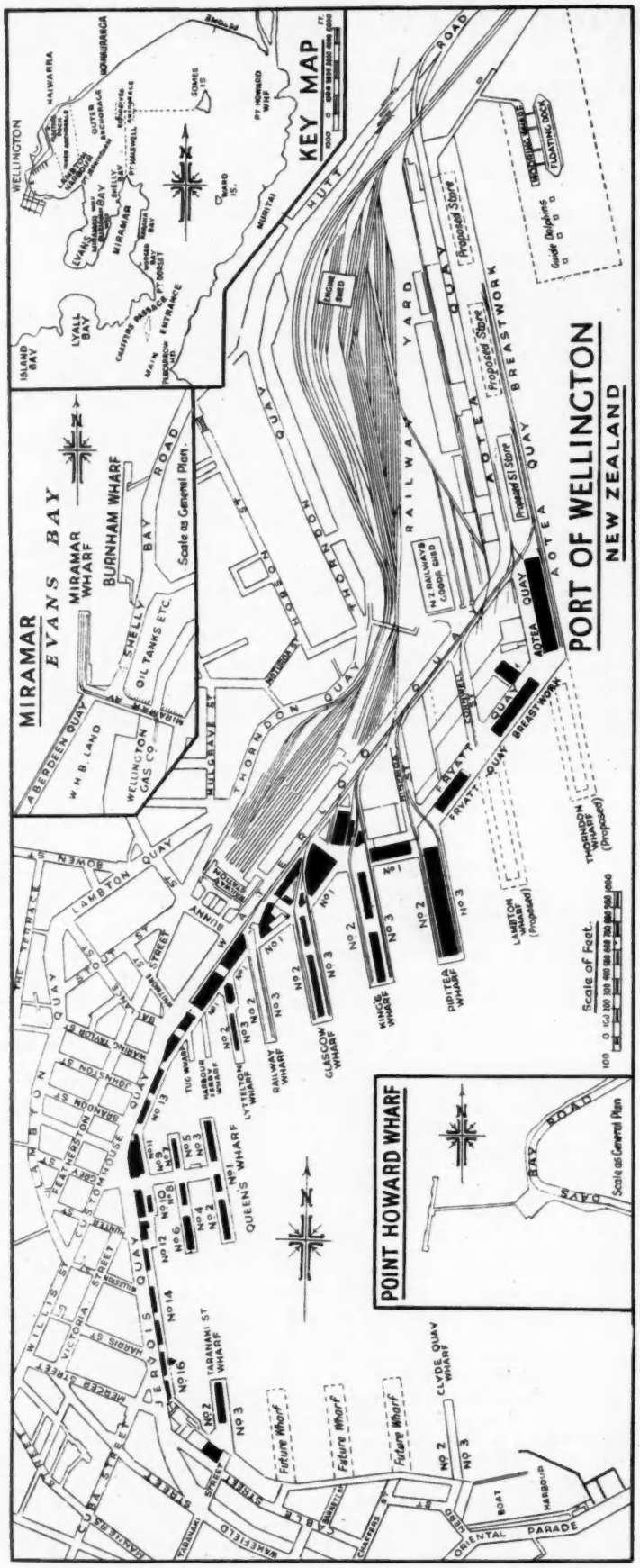
General Constitution

On 1st November, 1878, there was passed by the General Assembly of New Zealand an Act entitled "The Harbours Act, 1878," to regulate the management of harbours and to make provision for matters connected therewith. Many of the Harbour Boards of New Zealand were brought into being by this general Act, which now, as amended and consolidated, is called "The Harbours Act, 1923." This general Act provides for the constitution of Harbour Boards and vests in them the control and management of the various harbours of New Zealand quite independent of one another, and with their own officials and staff necessary for the work of harbour management. These Boards decide and carry out such policy of harbour development and management as they consider best suited to the particular needs of their ports with direct responsibility for financing all work. No harbour works involving reclamations, wharf construction, etc., can be undertaken without the Government's approval. The membership of these Boards varies in number, from six to fifteen, according to the Special Act constituting them as a port authority.

Local Constitution

In 1878 a movement was started for the establishment of a Harbour Board. Legislative authority being obtained, the Wellington Harbour Board was constituted under the Harbours Act and a Special Act entitled "The Wellington Harbour Board Act, 1879." This Special Act came into operation on 1st January, 1880, the first election of elective members being held during the following month of that year and the Board's first meeting on February 20th, 1880, it taking over from the Railway Department, the Railway Wharf and adjacent breastwork at Waterloo Quay. On October 1st, 1881, the Board, as the result of negotiations with the City Corporation, acquired the Queen's Wharf and Bonded

Port of Wellington, New Zealand—continued



Warehouse, and since that date it has administered the affairs of the port.

Administrative System

The Wellington Harbour Board is practically alone among the Boards of the Dominion as, in addition to its primary function of administrative control and regulation of the port, it acts as wharfinger, receiving the cargo from the ship's slings, giving receipts therefor, and, upon delivery orders from the ship, delivering such goods to consignees or transhipping to other vessels as required. Thus the work is carried out more satisfactorily and efficiently than if it were left to varied control. Another important merit of this system is that it establishes a strong central authority, having full control over the work of receiving and delivering, and acting impartially in the interests of both ship and consignee.

In addition, the Board undertakes the dumping of wool and hemp, the supply of water to shipping, the storage of duty-paid or free goods, the warehousing of bonded goods, and provides cool storage accommodation for cheese and fruit. Its wharves and stores are equipped with hydraulic and electric cranes and appliances for receiving and loading cargo.

Charges

The Board, being a public body whose objects are the providing of efficient shipping and cargo facilities and the encouragement of trade at the cheapest possible cost for all services, has framed its charges with a view to producing only such margin of revenue over working expenses as will suffice to cover standing charges and provide a reserve fund for contingencies.

Special attention is drawn to the particularly favourable position of the Port of Wellington as a transhipping centre. Vessels passing to and from Australia and desirous of making one call only in New Zealand will find that their cargoes for other ports in the Dominion can be distributed in an economical and expeditious manner from Wellington. It is the nearest main New Zealand port to Sydney and Panama.

Berthage Accommodation

Conveniently situated to the main streets of the City, the Board has ten City Wharves, and almost continuous breastworks and sea walls extending over 3 miles of the waterfront, the total lineal berthage being 23,370 feet, with depths of water alongside varying from 16 feet for coastal vessels, to 41 feet at low water for oversea vessels. Of this total 8,730 feet of berthage is linked up with the Dominion's railway system. In other parts of the harbour there are six wharves with a total lineal berthage of 4,290 feet. Wellington has the reputation of being the easiest and safest port in the Dominion for the handling and berthing of large oversea ships, and the deepest draught merchant vessels that have worked a New Zealand port have been accommodated at the main wharves.

The Cunard White Star liner, S.S. *Aquitania* (44,786 tons gross), the largest merchant vessel to visit New Zealand, was berthed at Pipitea Wharf, and her draught of 36 feet 9 inches is a record for the Dominion.

Transit Cargo Stores

On the City wharves and adjacent breastworks are thirty-four stores with a total gross storage capacity of approximately 196,000 tons. Two of these stores are the largest and best equipped transit stores in the Dominion, Store No. 37, on Pipitea Wharf being 759 feet long and 106 feet wide, with a gross storage capacity of 23,624 tons; and Store No. 49, on Aotea Quay, having a length of 647 feet and a width of 100 feet, with a gross storage capacity of 28,080 tons.

Cargo Handling Appliances

For the expeditious and economical handling of cargo in the stores, overhead lifting gear is provided throughout, and, in the principal stores, overhead electric travelling cranes are installed.

These high-speed electric cranes have lifting capacities of from 30 cwt. to 5 tons. In one of the wool stores, in addition to electric overhead travelling cranes, is installed a bicycle crane for unloading wool from railway trucks. In the Board's Cool Store there are electrically-driven elevators, stackers and conveyors for the careful handling of cheese, apples, etc..

Port of Wellington, New Zealand—continued

Hydraulic wool presses are installed in the wool stores.

A number of cargo-handling sheds are fitted inside and outside with 15 cwt. hydraulic jiggers, which are handy for stacking cargo and unloading vehicles.

At convenient intervals on the wharves are placed 67 moveable hydraulic cranes varying in power from 2 to 2½ tons, and 8 electrically-operated quay cranes of 3 tons capacity, capable of commanding both road and railway line, and adaptable to the loading and discharging requirements of ships. At the Railway Wharf, where most of the coal is discharged, the cranes are fitted with grabs for unloading coal into railway trucks direct, or into hoppers fixed to the cranes themselves for discharge into vehicles. Two fixed hydraulic cranes with capacities of 10 tons and 20 tons respectively, and a floating crane with a lifting capacity of up to 80 tons, are available for heavy lifts.

The Board also operates 10 mobile cranes with lifting capacities of from 30 cwt. to 5 tons for handling goods and manœuvring, with their loads, in confined spaces.

Floating Dock

The Board owns and operates a floating dock having a lifting capacity of 17,000 tons. Its principal dimensions are:—

	feet
Overall length over platforms	584
Overall length over keel blocks	533
Clear width between fenders	87
Overall length of side wall	452
Overall height of side wall above outer edge of pontoon	35
Height of keel blocks	4
Depth of water over keel blocks	25

The dock is of the self-docking sectional box type, designed by Messrs. Clark & Standfield, London, and built by Messrs. Swan, Hunter & Wigham Richardson Limited, Wallsend-on-Tyne, England. Electric power is used throughout. Four warping capstans capable of exerting a pull of 5 tons at 50 feet a minute are fitted on top of the wall deck. The dock is also fitted with other facilities such as fire and wash-down services, and air-compressors for repair tools. Alternating electric current, 50 cycle, is available for ships' or contractors' purposes at 400 volts, 3-phase and both 230 and 105 volts, single-phase. An electric crane is installed on the seaward wall of the dock, capable of lifting 2 tons at a radius of 54 feet and 5 tons at a radius of 27 feet.

The dock was towed out to New Zealand and arrived at Wellington in December, 1931, after an ocean towing record of 14,109 miles; the time taken was 167 days.

Imports and Exports

The total tonnage of goods of all classes handled inwards and outwards at the port for the year 1946 was 2,000,291 tons. Of the value of imports into the Dominion during 1946, Wellington received £25,488,455 out of a total of £66,559,601, or 38 per cent.

The principal exports are wool, cheese, butter, casein, frozen meat, fruit, casings, skins, hides and tallow.

During the year 1946, out of a total value of £94,609,216, Wellington handled £22,594,487, or nearly 24 per cent. of the Dominion's total exports.

Wellington is an important wool-selling centre and, of the total of 849,334 bales appraised in New Zealand during the 1945-46 season, 112,087 bales were exhibited here.

The number of bales of wool actually exported from the port during 1946 was 195,619, or over 19 per cent. of the total exportations from the Dominion.

For the receipt and storage of cheese and fruit requiring cool storage at a uniform temperature whilst awaiting export, there is a cool store operated by the Board, accommodating 57,000 crates of cheese and 58,000 cases of fruit, which can be stored to await the overseas loading steamer. Mechanical conveying appliances have been installed, and exporters from Wellington can depend upon getting good accommodation and careful handling at reasonable rates.

Transhipments

The uninterrupted lay-out of the wharves, with connecting breastworks, is particularly suitable for the transport of goods by tractor, and the Board handles a large volume of transhipments and other goods by this means. To these tractors, which are able to haul loads up to 25 tons capacity, are attached trailers, capable of being loaded up to three tons. Being easily manœuvred inside and outside the Board's stores, the tractors are able to shift goods economically and efficiently.

By reason of its central position, low charges and facilities for rapid despatch, Wellington is unrivalled as a distribution centre and is the principal transhipping port of the Dominion. Of New Zealand's total transhipment tonnage of 209,944 tons for 1946, 148,766 tons passed through the Port of Wellington.

Oil Wharves and Berthage

For the safe and convenient handling of petrol and fuel oils in bulk, the Board has provided special berthage accommodation, with ample depth of water. These facilities are availed of by the oil companies in the distribution of oil in bulk to and from the ports of New Zealand.

80-Ton Floating Crane, Wellington.

In Evans Bay, one of the principal oil companies, under lease from the Board, has the use of a reinforced concrete wharf, called the Burnham Wharf, for distributing therefrom petroleum products in bulk or in drum, and to this wharf the tanks of two of the oil supply companies have been connected by pipe line. There is ample depth of water here for accommodating oversea oil tankers fully loaded.

At Point Howard, on the eastern side of the harbour, the Board has erected a timber berth for the purpose of berthing oil tankers supplying petrol by pipe line to the storage tanks of three companies situated in the Hutt industrial area.

At Aotea Quay, in the City area, there is an oil berth, and pipe lines extend from this berth to tank installations at Kaiwarra.

Port of Wellington, New Zealand—continued

Bunkering

Fuel Oils.—In Evans Bay is also situated the Miramar (Timber) Wharf. This wharf is connected by pipe line to oil supply tanks in close proximity. Both this wharf and the Burnham Wharf can accommodate deep draught vessels, and fuel and Diesel oils for bunkers are held in ample supply, either direct, or by means of oil barges to vessels berthed at the City wharves, if a vessel does not desire to shift for bunkers.

Industrial Areas

Within the metropolitan area and in the surrounding districts of the Port of Wellington are located many of the principal manufacturing industries of the Dominion.

The growth of the port is reflected in the steady development of secondary industries within easy reach of port facilities and, during the last twenty years, this industrial expansion has been particularly marked in the Hutt Valley area comprising the districts of Lower Hutt and Petone. Situated about eight miles by road or rail from Wellington, the Hutt Valley, by reason of its proximity to the City and Port of Wellington, is admirably suited

Interior of Transit Shed, showing cargo received from Great Britain and sorted for delivery.

for the establishment of light and heavy industries. The industrial concerns established there include motor assembly plants, oil tank installations, meat and preserving works, woollen mills, and factories dealing with tobacco, timber, cordage and twine, soap and candles, porcelain, metals, and a wide range of foodstuffs. The Government has also large railway workshops in this area.

About four miles by flat road from the centre of the City, and in proximity to the Miramar and Burnham Wharves in Evans Bay, have been established gasworks, the City power station, oil tank installations, bitumen plants, brick and pipe works, timber mills, and a number of other concerns requiring easy transport facilities and a convenient placed port outlet.

Rongotai Airport

Air mail and passenger services are operated from Rongotai Aerodrome, situated on the Miramar Isthmus, about three miles from the centre of the City. Regular services operated by the New Zealand National Airways Corporation are maintained to air stations in the North Island and across Cook Strait to the South Island. The passenger traffic at Rongotai in the year ended 31st March, 1947, was: Arrivals 29,392; departures 28,820—a total of 58,212 passengers for the year. It is proposed to enlarge and develop this aerodrome, to provide Wellington with a main airport adequate to the needs of the Capital City.

Proposed Base for Flying Boats at Evans Bay

Flying-boats visiting Wellington are moored in the spacious waters of Evans Bay, which is adjacent to the Rongotai Aerodrome and forms the northern bight of the Miramar Isthmus. This area of approximately 1,000 acres, entirely free from surface obstruction, offers eminently suitable landing and taking-off reaches and sheltered base waters for flying-boats. Geographically, Wellington is ideally situated as a centre for the distribution of passengers and mails by means of road, rail, steamer and land-plane services.

In view of the possible future extension in the use of flying-boats, particularly in direct flight from Sydney to Wellington in the trans-Tasman Service, the Board has prepared plans for a modern base for flying-boats which will, if required, be established at Evans Bay to provide the necessary additional facilities for this form of air transport.

Construction Works

The Board has a Port Development Committee whose function it is to investigate and review improvements to the facilities of the port. This Committee had, before the war, recommended a programme of new works, but this project had to be postponed until the war had ended.

The Port Development scheme has been reviewed recently and the Board has now decided to proceed with a programme of construction as the supply of labour and materials permit.

The first work to be put in hand will be the replacement of Store No. 39, a timber shed which has passed its economic life, with a new concrete store, 360 feet long by 77 feet wide, and a contract has been let already for this. Like all the modern stores, the new store will be equipped with overhead electric cranes. Concurrently with the building of the new store, the Board will, with its own labour, renew in reinforced concrete 200 feet of timber breastwork on Fryatt Quay which adjoins the store. This will complete the whole of the Fryatt Quay breastwork in concrete.

The second major work to be undertaken will be the construction of No. 51 Store on Aotea Quay. This will be 600 feet long by 102 feet wide, and will also be in concrete. Drawings for the store are in hand and tenders will be called shortly.

Other works of high priority include the provision of new electric cranes for King's Wharf, and the reconstruction of the Jervois Quay breastwork and sheds, involving also the widening by the Wellington City Council of the adjoining Jervois Quay roadway.

To finance these new works a loan of £600,000 has been arranged and will be taken up over the next few years.

Repairing and Construction Shops

The Board does most of the repair work necessary in maintaining its wharves, buildings, equipment and plant. It also carries out a large proportion of its wharf and building construction.

Boating Facilities, Evans Bay

In providing further facilities for yachting and boating in the harbour, the Board recently enlarged a reclamation in Evans Bay to give additional space for slipping yachts and boats. A rubble breakwater, which is to extend to a length of 355 feet, is at present under construction.

Patent Slips

Situated in Evans Bay are two patent slips, operated by the Wellington Patent Slip Company, Limited.

Normally, the larger one can take vessels up to 2,000 tons, not exceeding in length 280 feet, or a greater draught than 18 feet at the forward end when going on the slip. The ways are laid to a gradient of 1 in 30, and are 1,049 feet in length, and at high water have a depth of 32 feet at the outer end.

The smaller slip has a length of cradle 150 feet, length of ways 750 feet, with gradient 1 in 20, and will accommodate vessels up to 170 feet and 750 tons displacement. Vessels can be cradled at lowest tide drawing up to 6 feet 9 inches at fore end of cradle and 14 feet 3 inches at after end, and at high water spring tide drawing up to 12 feet 3 inches at fore end of cradle and 19 feet 9 inches at after end.

Its hauling machinery consists of twin high-pressure geared steam engines, with wire-hauling rope; hauling speeds 300 tons—60 feet per minute, 500 tons—36 feet per minute, 750 tons—20 feet per minute. The cradle is of hardwood and is designed to allow

Port of Wellington, New Zealand—continued

Wellington Harbour, showing Principal Overseas Wharves.

View of Railway Yards and Wharves.

Port of Wellington, New Zealand—continued

greatest possible convenience for effecting repairs to vessels using the slip.

Customs Examination and Port Health Inspection

All vessels arriving from overseas are required to go to anchorage to await inspection by the Port Health Officer and Customs officials. After pratique has been granted by the Port Health Officer, Customs officials carry out the requirements under the Immigration Restriction Act. Inward Declarations are required from passengers arriving, and their passports are examined and stamped. While this procedure is in progress under the direction of the Boarding Inspector, other Customs officers carry out the checking and sealing of high duty stores, searching of vessel and examination of crew search list, etc.

When the Immigration requirements have been satisfied, the vessel is allowed to proceed to her berth, where passengers are disembarked and all luggage placed in Customs Examination Shed for examination and delivery.

Harbours Association of New Zealand

An Association of the various New Zealand Harbour Boards under the above title exists, having for its objects the collection and circulation of information, the safeguarding of the interests of Harbour Boards, and the taking of action in relation to any subjects or proposed or existing legislation affecting them. Twenty-seven of the Harbour Boards of the Dominion are affiliated to the Association. The Executive Officers of the Association are, ex officio:—

President:—Chairman, Wellington Harbour Board (W. H. Price).

Vice-Presidents:—Chairmen of Auckland, Lyttelton and Otago Harbour Boards.

Five Other Representatives:—Chairmen of Bluff, Napier, Nelson, New Plymouth and Timaru Harbour Boards.

Secretary and Treasurer:—W. J. Gardner, P.O. Box 595, Wellington, New Zealand.

Waterfront Industry Commission

In April, 1940, the New Zealand Government set up a Waterfront Control Commission for the purpose of organising the loading and discharging of vessels, in order to expedite the turn-round of ships, which became so vital a factor in the prosecution of the Dominion's war effort.

The Government, in July, 1946, reconstituted this body as the Waterfront Industry Commission, with functions and powers similar to those granted to the previous Commission.

Established under regulations administered by the Minister of Labour, the Commission, upon its reconstitution, consisted of five members, comprising two nominees from each of the workers' and employers' organisations, with an independent Chairman. In February, 1947, the five members of the Commission vacated office under an amendment to the regulations, a sole Commissioner being appointed in their stead.

In the main, the functions of the Commission are:—

To ensure the utmost expedition in waterside work; to ensure the provision of sufficient labour for such work and to ensure that waterside labour is used to the best advantage; and generally to provide for the regulation, control and performance of waterside work. The Commission prescribes the conditions upon which labour may be employed and also the terms of such employment including rates of pay, provision for holidays, and a guaranteed minimum payment. The Commission also fixes rate of remuneration for water-side work performed under a system of payment by results, known as co-operative contracting. Under this system the men receive a bonus on a tonnage or unit basis, and the quicker a vessel is loaded or discharged the greater the return to the men at an hourly rate. In 1946, the total profit distributed to waterside workers at New Zealand ports amounted to approximately £200,000.

Port Committees, appointed by the Minister and subject to the control and direction of the Waterfront Industry Commission, are set up at the principal ports of the Dominion.

The functions of such Committees, which are comprised of an equal number of employers' and workers' representatives with an independent Chairman, are:—

To ensure the supply of labour for the efficient working of the port; classify waterside workers; supervise and control the working of the port in such a manner and in such order of priority as it thinks fit; and to make and enforce rules for these purposes; to take measures to prevent local disputes; to allocate holidays to waterside workers in accordance with conditions prescribed by the Minister of Labour.

To perform and exercise such other duties and powers as may from time to time be allocated to it by the Commission or delegated to it under the Regulations.

The Commission is empowered to impose levies on the owners, agents or masters of ships and on other employers of waterside labour, for carrying out its functions, and in particular, for the following purposes:—

(a) Providing and operating labour engagement bureaux and central pay offices.
(b) Providing for guaranteed minimum payments to waterside workers.
(c) Providing for pay for holidays allowed to waterside workers; and
(d) Providing and operating amenities for waterside workers, including waiting rooms, restaurants and canteens.

Bureau System for Employment of Waterside Labour

A Bureau System for the engagement of casual waterside labour is established at the Port of Wellington. The object and aim of this Bureau System is to decasualise as far as possible the conditions of employment of waterside workers, who must be members of their Union and, as such, receive preference of employment.

A Port Committee set up under the Waterfront Industry Emergency Regulations, 1946, provides for and supervises the employment of casual waterside workers. This Committee consists of four representatives from the workers and four representatives from the waterside employers, with the local Branch Manager of the Waterfront Industry Commission as Chairman. The Bureau System is confined to the total membership of the local Waterside Workers' Union at the Port of Wellington, each man on accepting employment being called upon to transfer from ship to ship or from job to job, providing he is not asked to perform unaccustomed work. The working of the Bureau is controlled by a manager directly responsible to the Port Committee for operating the scheme and carrying out the rules. Those watersiders who are classed "A" men by the Committee, and who comply with the conditions of the system, are guaranteed work in each week to the value of not less than £5, or, failing the provision of such work, they have their wages made up to that sum. This guarantee does not apply to "B" class men, who, through advanced age or physical infirmities, are not capable of fully performing the various classes of work, or to men whom the Committee decide to place on the "B" list either temporarily or permanently. Unionists are also guaranteed work in each day (Mondays to Fridays inclusive) to the value of two hours at the ordinary rate of pay, or if such work is not provided, they are paid that sum. Both the "A" and "B" class watersiders have their hours equalised as far as possible. Employers of waterside labour are responsible for the cost of operating the Bureau System, and for any financial loss which may be involved in providing guaranteed weekly and daily payments. The nominal membership of the Waterside Workers' Union is 1,700—four hundred being allotted to the Harbour Board, which supplies labour incidental to the receiving and delivering of cargo from the ships' slings and also provides labour for unloading vehicles with goods for shipment.

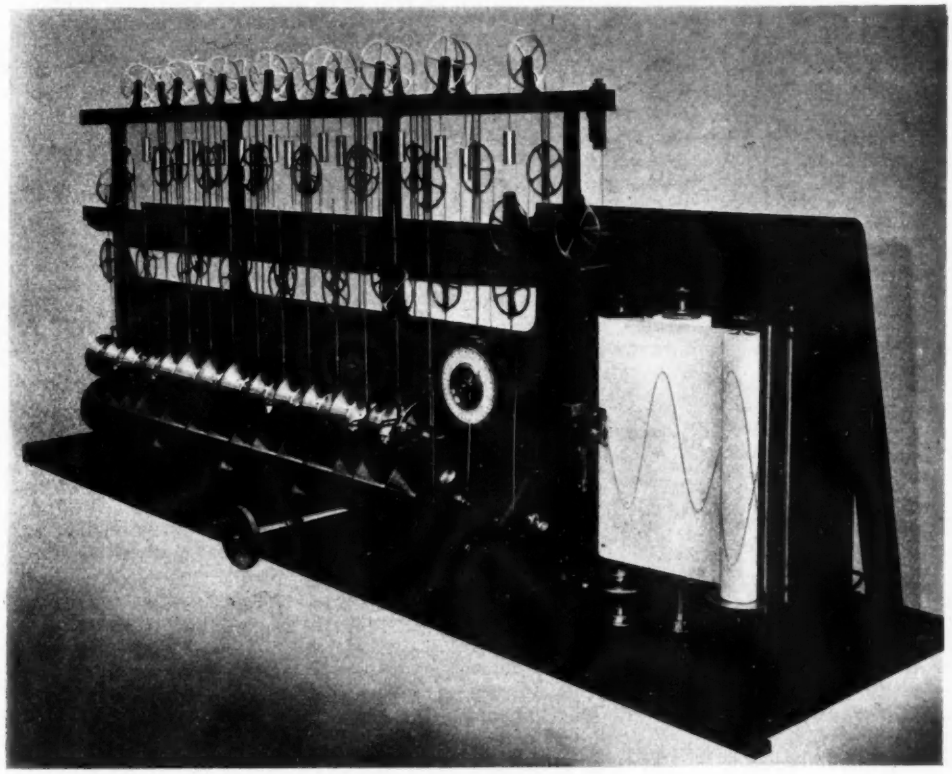
A large waiting room has been provided in Store 15 by the Board for the convenience of casual waterside workers awaiting employment, and, in an annexe thereto, facilities have been installed by the Board to enable men to get hot meals without leaving the wharves. Hot water baths, and lockers, are also provided.

[All the photographs in this article were kindly supplied by The High Commissioner for New Zealand.]

Liverpool Observatory and Tidal Institute

Excerpts from Annual Report for 1947

In the Annual Report for 1947, it is announced that two changes in the Governing Committee have been made during the year. Captain Hart has been succeeded by Commander Harbord, and Lieut. Commander Mornement has been succeeded by Lieut. Commander Lankester. The principal change in the staff is that of the appointment of Mr. Corkan as Deputy Director. Mr. Corkan has been in the service of the institution since 1929, when the Liverpool Observatory and Tidal Institute were combined. He has made notable researches on cotidal charts for British Waters, the tilting of the ground due to tidal load, and on storm surges.



Norwegian Tide-Predicting Machine.

Publications

Owing to the pressure of other work, the publication of several papers embodying the researches done by the institution has had to be postponed, but the following papers have been prepared and will shortly be issued:—

"Storm-surges, their importance in modern tidal science and some results of a recent investigation." (R. H. Corkan, *Dock and Harbour Authority*.)

"Storm-surges." (A. T. Doodson, *Hydrographic Review*, Monaco.)

"Tides in shallow water." (A. T. Doodson, *Hydrographic Review*, Monaco.)

"Tide models." (A. T. Doodson, *Hydrographic Review*, Monaco.)

"Some observations of wave and other fluctuations in a tidal current." (K. F. Bowden, *Proc. Royal Society*.)

The first of these papers contains a brief summary of a Report prepared by Mr. Corkan for the London County Council and the Port of London Authority, which was described in the report last year. The original report is rather bulky and if it is not found possible to publish it in full, arrangements will be made for a small number of copies to be made. The article by Mr. Corkan gives a general description of the results.

The next three papers are reports of three lectures described later.

The fifth paper is an account of work done in collaboration with the University Department of Oceanography, as described in the report made last year.

Scientific Conferences

The Institution was honoured by an invitation to the Director from the Directorate of the International Hydrographic Bureau in Monaco to attend the Fifth International Hydrographic conference held at Monaco, 22nd April to 5th May, 1947, the first since the war. He was also invited to give a number of lectures. A lecture on "Tides in shallow water" dealt with the causes of the great difficulties experienced in the prediction of such tides, and outlined the methods pursued by the Institute in grappling with the problems. Their effect on the design of tide-predicting machines was brought out, and practical conclusions drawn as to methods of overcoming the limitations of existing predicting machines.

A lecture on "Storm-surges" described the work done at the Institute on this highly important subject.

A third lecture, on "Tide models," was specially directed to the need for hydrographers to be aware of the limitations of tide-models used by hydraulic engineers. It embodied some of the conclusions of the investigations made by the Director regarding the tide-model used for the Severn estuary. Electrical methods for stimulating tidal motion were described and the relative advantages and disadvantages of the two types of model were summarised.

A fourth lecture described a cinematograph film on tides in oceans. The film was prepared by Dr. Barton some years ago from cotidal charts and gives animated views of the tides progressing in the Bristol Channel, round the British Isles, and in the Atlantic and Indian Oceans. The film itself is unique and created great interest. Many desires were expressed for copies to be made available for the instruction of hydrographic officers. This matter is still receiving attention, but there is no prospect of supplies being made available at an early date.

Research

Before the war, the Institute was greatly interested in the construction of cotidal charts from actual observations, and also in the numerical methods of determining the tides in seas and oceans. In recent years, great developments have taken place in the application of numerical methods to many diverse types of scientific problems, and Mr. Corkan has been investigating the adaptation of these methods to tidal problems. He has made progress in developing the rather intricate technique for an actual sea such as the Irish Sea. One of the purposes of the development of these methods is that of estimating by direct calculation the effects of barriers in estuaries. This is a matter of very great importance to tidal authorities and hydraulic engineers.

Apart from this, the researches referred to last year have been continued. The Director has spent considerable time on tide-models.

Intensive preparations are in progress for large-scale work at sea in 1948 in continuance of the work done on turbulence before the war and in 1946.

Liverpool Observatory and Tidal Institute—continued

Machines

A great deal of time has been devoted throughout the year to the design and production of tide-predicting machines. Reference was made last year to a machine under construction by Chadburns for the Norwegian Government according to a new design by the Director. This machine was completed in June and the tests on performance gave very satisfactory results.

Several foreign hydrographic authorities have made enquiries of the Institute with regard to the supply of tide predicting machines, and advice has been given as regards types and costs in relation to the particular problems for which they are required. Two machines have been ordered in this country and the Institute is advising the manufacturers (Marine Instruments, Ltd.) in all details of construction. Two other machines are in prospect also, so that it is likely that the Institute will be much engaged with mechanical problems involved in the re-designing of such machines.

The Institute's Kelvin machine has been re-conditioned by the staff during the year and four additional components have been added. The castings and gears have been obtained from a local firm, but the intricate work of fabrication and fitting has been done by the staff of the Institute. This is a new development, but it is one that is likely to be of great value to the Institute in facilitating improvements in existing machines and in general design.

Considerable interest has been taken in a small desk type of predicting machine with ten components as used in the German Navy during the war. Particulars of this machine were given by the Director at Monaco, and, as several Hydrographic Officers were desirous of possessing machines of this type, arrangements have been made for manufacturing them in Glasgow (by Marine Instruments, Ltd.) and negotiations are being conducted by the Institute regarding the supply. The Institute will be responsible for overseeing the manufacture.

Many enquiries have also been received for tide-gauges and current meters, and the Director has been discussing the manufacture of these instruments.

The Institute had two Favé depth meters on loan from the Hydrographic Department and these had been used in the work at sea before the war. They were prepared for certain investigations in the Bristol Channel and some records were obtained from them, but the conditions were so adverse to their use that they were both lost at sea. The Institute is using its new facilities to construct two more such instruments, and two more current meters of Dr. Doodson's design will be constructed also for the 1948 programme of research at sea.

The distant-reading tide gauge, recording at the Observatory the tides on the dock wall at Birkenhead, over three miles away, is now again in service. Additional relays have been incorporated, leading to increased certainty of action.

The various methods of recording tides, whether by mechanical gauges, electrical gauges of the distant-recording type, or pressure gauges, are continually under review on account of the increasing demand for such apparatus.

Dock and Harbour Authorities' Association

Pollution of Rivers and Streams

Salient Points from a Memorandum Prepared by the Association and Submitted to the Prevention of Pollution Sub-Committee of the Central Advisory Water Committee.

The Association understand that the Sub-Committee are investigating measures for strengthening the law regarding the prevention of the pollution of rivers and streams, and are in particular collecting evidence on the following points:—

(a) Whether amendment of the River Pollution Prevention Acts is desirable;

(b) if so, whether it is desirable to incorporate in the general law any of the additional powers set out in the Appendix to the Ministry of Health letter of 30th October, 1946, Ref. X.91222/14/10, which have been conferred on particular Authorities by local Acts or have been suggested in evidence to previous Committees; and if so, on what grounds;

(c) any other proposals for the strengthening of the law; having regard to the River Boards Bill recently introduced into the House of Lords.

The Rivers Pollution Prevention Act, 1876, provides:—

Section 2. " Every person who puts or causes to be put or to fall or knowingly permits to be put or to fall or to be carried into any stream so as either singly or in combination with other similar acts of the same or any other person to interfere with its due flow or to pollute its waters with solid refuse of any manufactory, manufacturing process or quarry or any rubbish or cinders or any other waste or any putrid solid matter shall be deemed to have committed an offence against this Act."

Section 3 makes it an offence to cause or knowingly permit to fall or flow or to be carried out into any stream any solid or liquid sewage matter.

Section 20 defines " stream " as " including the sea to such extent and tidal waters to such point as may after local inquiry and on sanitary grounds be determined by the Local Government Board by Order published in the *London Gazette*, save as aforesaid it includes rivers, streams, canals, lakes and watercourses other than watercourses at the passing of this Act mainly used as sewers, and emptying directly into the sea or tidal waters which have not been determined to be streams within the meaning of this Act by such Order as aforesaid."

So far as is known, no Order extending the provisions of the Rivers Pollution Prevention Act, 1876, to tidal waters has been made by the Minister of Health or his predecessors.

The following is a summary of the existing law with reference to pollution prevention in harbours:—

By an Act of 1746 (19 Geo. II, Cap. 22, Sec. 1), it is provided that ballast, rubbish, gravel, earth, stone, wreck or filth must not be cast, thrown or unladen from any vessel into any haven, port, road, channel or navigable river in England, except " upon land where the tide or water never flows or runs " under a penalty of not less than £5 nor more than £50.

By an Act of 1814 (54 Geo. III, Cap. 159) entitled " An Act for the better regulation of the several ports, harbours, roadsteads, sounds, channels, buoys and navigable rivers in the United Kingdom and of His Majesty's docks, dockyards, arsenals, wharves, moorings and stores therein, and for repealing several Acts passed for that purpose," it was enacted

" . . . that if the owner, master or other person having the charge or command of any private Ship of War, transport, or other private or Merchant Ship or Vessel, Lighter, Barge, Boat or other Craft whatsoever or any person working any quarry, mine or pit near to the sea or to any such harbour, haven or navigable river as aforesaid, or any other person or persons whatsoever, shall cast, throw, empty or unlade or cause or procure to be cast, thrown, emptied or unladen, either from or out of such ship or vessel, lighter, barge, or boat or other craft or from the shore any ballast, stone, slate, gravel, earth, rubbish, wreck or filth into any of such ports, roads, roadsteads, harbours, havens or navigable rivers of this Kingdom as aforesaid so as to tend to the injury or obstruction of the navigation thereof, or in any place or situation on shore, where the same shall be liable to be washed into the sea, or into any such ports, roads, roadsteads, harbours, havens or navigable rivers, either by ordinary or spring tides, or by storms or landfloods; all and every such person and persons so offending shall for every such offence forfeit and pay a sum not exceeding the sum of Ten Pounds over and besides all expenses which may be incurred in removing to a proper place the said matters which may have been deposited contrary to the provisions of this Act . . ."

Dock and Harbour Authorities' Association—continued

The Act of 1814 is supplemented by Section 73 of the Harbours, Docks and Piers Clauses Act, 1847, which imposes a penalty upon persons who throw ballast, earth, ashes, stones or other thing into a harbour or dock. This Section is incorporated or re-enacted in the private Acts of a number of harbour authorities.

By the Oil in Navigable Waters Act, 1922, it is an offence to discharge any oil or allow it to escape into the waters of any harbour in Great Britain and Northern Ireland, and a duty is imposed upon all harbour authorities to apply the provisions of the Act and conduct prosecutions thereunder.

The Association supports the principle that the discharge of sewage and polluting trade effluents into a river or any of its tributaries should, so far as it is practicable, be prohibited, but at the same time it is appreciated that the discharge of trade effluents, more particularly into tidal waters, may be an economic necessity. The extent to which the discharge of trade effluents into tidal waters should be permitted is a question to be dealt with for each river by itself, having regard to all the circumstances. The case governed by the Lee Conservancy Act, 1868, and the Thames Conservancy Act, 1932, to which many references are made in the Appendix, is very particular. The Association strongly support the recommendations in paragraph 74 of the Third Report of the Central Advisory Water Committee—that it would be undesirable to extend the Rivers Pollution Prevention Act, 1876, generally to tidal waters.

The Members of the Association are vitally concerned with the effect the discharge of sewage and trade effluents may have upon the regime of any river, estuary or harbour, and whilst the Association raises no objection to the powers of the Act of 1876 being extended so as to be exercisable by the new River Boards on public health grounds, the Association would take the strongest objection to the taking away of either the general powers or the special powers which certain of the Authorities have in relation to the prevention of pollution which is, or is likely to become, detrimental to the conservancy of the river, estuary or harbour. They would further object to the River Board being empowered to consent in particular cases to the discharge of sewage or trade effluent into waters under harbour jurisdiction without first obtaining the approval of the harbour or conservancy authority.

In conclusion, the Association desires to draw attention to what has taken place in connection with the discharge of sewage into the River Mersey:—

> In 1927 a Committee of Scientists was appointed by the Mersey Docks and Harbour Board in association with other Mersey navigation authorities to investigate the whole Mersey sewage problem. After three years of inquiry that Committee reported that the continued discharge of crude sewage into the Mersey constituted a grave danger to the conservancy of the River. This conclusion was not accepted by the local authorities concerned, and in 1932 the navigational authorities in co-operation with the various local authorities affected, invited the D.S.I.R. to undertake an investigation. The conclusion of that Committee reporting in 1938 was that the crude sewage discharged into the estuary of the River Mersey had no appreciable effect on the amount and hardness of the deposits in the estuary.

The Association submits that before it can be determined what amendments, if any, are desirable in the present law for effecting a greater measure of pollution prevention, particularly in harbours, it is necessary to have available more scientific knowledge as to the capacity of fresh water and sea water in varying conditions to bear pollution by crude sewage and various trade effluents before the water becomes fouled to such extent as to be deleterious to the public health or harmful to the regime of a river, estuary or harbour. This knowledge can only be obtained by suitable research being organised by the Government.

The Problem of Mining Subsidence

Abstract from a Statement Made on Behalf of the Association to the Committee Appointed by the Minister of Fuel and Power to Examine the Law of Support and the Problem of Damage Caused by Mining Subsidence in the Light of Nationalisation of Coal and the Coal Mining Industry and to make Representations.

The overseas trade of the United Kingdom is essential for the well-being of the population and is reflected in the standard of life of its inhabitants and it is necessary, therefore, that the Port Authorities be adequately equipped for the rapid and economic handling of the overseas trade. It would be seriously detrimental to the trade of the country if the efficiency of the ports were imperilled by diminution of their physical effectiveness.

The assets of individual Dock and Harbour Undertakers are of necessity closely concentrated; are of special importance as economic units and invaluable from the strategic standpoint. It is not practicable in any area subject, or likely to be subject, to mining subsidence to disperse the works of a Dock and Harbour Authority in order to avoid the danger.

It may, for geographical reasons, be impracticable to build outside an area of possible subsidence. It would, therefore, appear reasonable to ask for support in respect of areas already built upon and also for support to lands which must be assumed to be available for port development in the future. The Association contend that because of the concentration into relatively compact areas the amount of support required for dock and harbour structures is and can be maintained at a reasonable minimum.

The principal structures for the benefit of trade and shipping comprise piers and breakwaters which are in many cases in the nature of sea defences and erected for the purpose of securing harbours of refuge and safe entrances to the ports, as for example, the North and South Piers at the entrance to the River Tyne, the piers at the entrance to the River Wear; wet docks for the shipment of coal and coke and the import and export of goods, as at Seaham Harbour, Liverpool, Tyne, Hartlepool, Leith, Cardiff and other South Wales ports; riverside quays for the handling of all kinds of general merchandise, coal staithes and other forms of shipping appliances for the loading of coal and coke, as typified on the Tyne, Immingham, Grimsby, Sunderland and at Cardiff, Newport, Swansea; river walls for the protection of river banks and training the course of a river, as on the Tyne and Tees. The buildings, as distinct from structures, which require to be borne in mind are chiefly warehouses, granaries, transit sheds and similar buildings, railways and such quayside facilities as cranes and other forms of electric and hydraulic plant used in the loading and discharging of vessels.

Some Port Authorities have their own engineering yards designed and constructed for the purpose of maintaining the plant and equipment of the port and also ship repairing yards, including slipways and ancillary facilities for repair and maintenance of the floating plant and craft of the undertaking.

The Association appreciate that the production and distribution of coal are of primary importance and without adequate distribution production must be impeded. The experience in the principal coal ports is that the output of the collieries must be distributed expeditiously by sea in order to maintain the freedom required at the pithead for the prompt transfer of coal to the point of shipment and thence to the point of consumption.

In the past, financial considerations often deterred Coal Companies from taking any risks in the mining of coal under the expensive installations of Dock Authorities and in consequence induced them to leave areas of coal unworked as support for these installations. With the passing of ownership of coal and collieries to the Government, these financial considerations may no longer operate and, with the added need for the winning of coal, risks may be taken in this direction which were not faced in the past.

It is probable that there is in Great Britain a considerable volume of coal already sterilised for support, and sooner or later many of the existing seams will be outworked, apart from the coal left for support. It may not be unreasonable to assume that there will be tendency towards reducing the area of sterilised coal in these outworked seams in order to extract the maximum amount of minerals before finally abandoning the workings. The effect of any such operations would be looked upon by the Association with considerable anxiety, and it is hoped that the Committee will have in mind, so far as dock undertakings are concerned, the desirability of placing an embargo on reducing the support to surface lands given by coal as and when outworked seams are to be abandoned.

Dock & Harbour Authorities' Association—continued

In the report of a survey of the Durham Coalfield, presented to the Minister of Fuel and Power in 1945 (and which survey was undertaken at the request of the then Minister), it was stated that the consequences to the industry of subsidence have been so expensive that coalowners have developed a sensitiveness to any threats of such occurrence; that this factor has, no doubt, contributed to an increase in the margin of safety by leaving supports of coal pillars in past workings, with the result that the coal sterilised from this cause is probably extensive. The " Surveying Committee " were of opinion that much of this coal can still be won provided modern methods of support are adopted and the extra cost of employing these methods is reimbursed to the Colliery Companies. The same Committee went on to say that the decision as to whether the coal should be worked would depend upon (a) the type of buildings or works on the surface, and (b) whether any indemnity or compensation will be available for the Colliery Company (*sic*) that causes the damage after the necessary precautions have been taken.

The decision as to the liability for any risk of damage resulting from such workings is one to be determined by considerations of national policy as to the necessity to extract the coal.

The Association feel that there should be a complete embargo on working coal underlying surface lands belonging to or used and occupied by Dock and Harbour Authorities or held by them for future port development.

The Mines (Working Facilities and Support) Act, 1923, which came into operation on the 1st January, 1924, in effect declared that the danger of minerals being left permanently unworked in order to support the surface was a matter of national concern. The Committee will have in mind the provisions of the 1923 Act, but the Association hope that in dealing with the law on the subject of Mining Subsidence the Committee will see their way to recommend that the importance of the properties of Dock and Harbour Authorities will not be overlooked.

An important factor associated with the law referred to in the 1923 Act is that there is to be consideration as to whether the support of the surface, works or buildings, is in the national interest more important than the working of these minerals.

The Association would call the attention of the Committee to the provisions of the Coal Mines Act, 1938, and in particular to Section 33 of that Act, which restricts the working of coal vested in statutory undertakers and passing to the Commission by virtue of that Act (now transferred to the National Board); the principle is there established that in dealing with a dispute between any such undertakers and the Commission the Railway and Canal Commission shall have regard primarily to the safety and efficient working of the undertakings in question.

The Minister of Fuel and Power (under Section 5, Sub-section 7, paragraph (g)) of the Coal Industry Nationalisation Act, 1946 is authorised to make regulations for the modification of provisions of the Coal Acts, 1938 to 1943, which may be necessary or expedient in consequence of the vesting in the Board of assets previously in the ownership of the Coal Commission. It may be that that authority would enable the Minister to modify the protection granted to Dock and Harbour Authorities under Section 33 of the Coal Act, 1938.

The Association view with anxiety the possibility of the security they have hitherto enjoyed, limited though it may be, being further restricted. The Association would, therefore, ask the Committee to recommend to the Minister of Fuel and Power the desirability of the retention of the principles expressed in Section 33 of the 1938 Act.

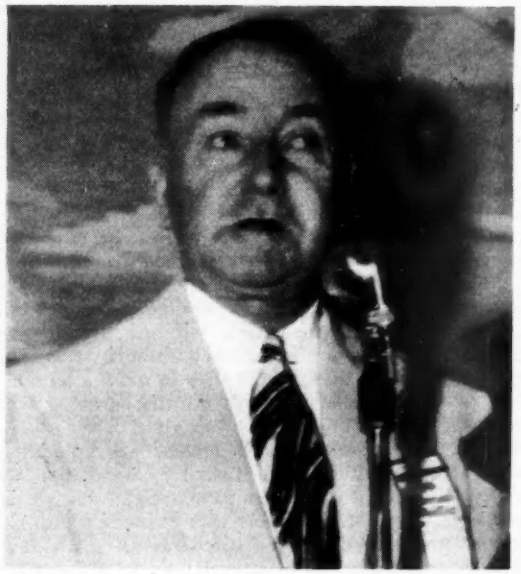
The Association hold the same view in regard to the powers vested in the National Coal Board under Section 8 of the 1946 Act. The Committee will have in mind that under this section the National Coal Board absorbed the powers of the Coal Commission (contained in Section 15 of the 1938 Act) to authorise interference in certain respects with underground land not belonging to them, but so as not to interfere with the surface lands or withdraw support from any land.

In conclusion, the Association trust that in calling the attention of the Committee to the supreme importance of the Dock and Harbour Undertakings of the country to the national interest, they will have impressed the Committee with the necessity that in any alteration of the present law the position of the Dock and Harbour Authorities will not be weakened. Further, the Association feel that they are justified in asking for a complete embargo to be placed on the withdrawal of support to Dock and Harbour properties. They suggest that the nationalisation of coal presents the occasion for providing that the cost of sterilisation of any coal left for support in the national interest should be borne by the community at large.

Notable Port Personalities

LVI—Mr. Robert Knowlton Smith

Robert Knowlton Smith, LL.B., K.C., was born on December 28th, 1887, at Amherst, Nova Scotia, Canada, and was educated at Cumberland County Academy in Amherst and at St. Francis Xavier University, Antigonish. He graduated from Dalhousie Law School, Halifax, Nova Scotia, and obtained his degree as Bachelor of Law in 1911, being admitted to the Bar of Nova Scotia on March 17th of that year. He practiced law in Amherst with C. R. Smith, K.C., under the law firm name of C. R. & R. K. Smith, and was elected Mayor of Amherst, 1923. He served five years



Robert K. Smith, LL.B., K.C.

on Amherst Town Council, and was President of Amherst Board of Trade for the years 1923 and 1924. Appointed Crown Prosecutor for Cumberland County, N.S., in August, 1925, he resigned this position in the following October to contest the constituency in the general election, which was then being held, and was elected a Member of the House of Commons, Ottawa, Canada. He was re-elected at the general election of September 14th, 1926, and again on July 28th, 1930.

Created a K.C. by the Government of Nova Scotia on January 6th, 1929, Mr. Smith acted as Counsel for the Maritime Board of Trade, and prepared and presented a brief before the Royal Commission on Transportation in 1932. He also acted as Counsel to, and prepared the brief for, the Nova Scotia Branch of the United Mine Workers of America for presentation to the Sir Andrew Rae Duncan Royal Commission investigating coal conditions in Nova Scotia (1933). He became Deputy Minister of Marine in August, 1935, and subsequently Director of Marine Services, Department of Transport, in November, 1936. He was appointed Chairman of the National Harbours Board of Canada on June 1st, 1940, and last December was elected President of the American Association of Port Authorities.

PORT OPERATION

Part 16 of a Series of Articles by A. H. J. Bown, M.Inst.T., A.C.I.S., and Lt.-Col. C. A. Dove, M.B.E., M.Inst.T.

(Continued from page 302)

Passenger Traffic Working (7)

One practical way of approaching the study of passenger traffic working at ports is to look first at the "Movements of Liners" as announced daily in the national newspapers. A recent routine announcement in *The Times* gave the following particulars:—

Queen Elizabeth from New York due Southampton, 4 p.m.	2nd March
Queen Mary from Southampton due New York, a.m.	3rd March
Capetown Castle, Durban for Southampton arrived Table Bay	1st March
Canton, for London, left Singapore	29th February
Elysia, for Baltimore, arrived Liverpool	1st March
Carnarvon Castle, Mombasa for Southampton, left Port Said	1st March
Samaria, Liverpool for Port Said, passed Gibraltar	29th February
Denbighshire, Shanghai for London, arrived Gibraltar	1st March
Port Phillip from Wellington, arrived Gravesend	1st March
Mauretania for West Indies, left New York	29th February
Stratheden, Sydney for London, called Fremantle	1st March
Sacramento from Hull, arrived New York	29th February
Sobo from London, arrived Sapele	29th February
Empire Test from Liverpool, arrived Aden	29th February
Egidia, Glasgow for Bombay, left Aden	29th February

It will be observed that United Kingdom ports mentioned in this typical announcement are Southampton, London, Liverpool, Hull and Glasgow. These ports—and particularly the first three—are the U.K. world terminals in the ocean passenger trade, but some other ports also deal regularly with passenger traffic—especially with passengers between Britain and Europe. Such ports are Newcastle, Harwich and Dover. Avonmouth has a small but important passenger trade with the West Indies. At Plymouth a certain amount of disembarkation takes place.

It may be of interest to carry in the mind some general notion of the volume of the traffic. The following figures relate to the period January to September (nine months) in the years 1947 and 1938:—

	1938	1947
Embarkations.		
Passengers by sea from U.K. ports to the Continent of Europe	1,538,908	1,043,690
Passengers by sea from U.K. ports to places beyond Europe	179,788	173,568
Disembarkations.		
Passengers by sea from the Continent of Europe to U.K. ports	1,581,993	1,060,462
Passengers by sea from places beyond Europe to U.K. ports	190,691	136,913

Air Travel

The following provisional figures for air passengers between the United Kingdom and the Continent (also for the first nine months of 1947) are worth noting in association with the sea-travel figures above:—

Departures from the United Kingdom ...	251,712
Arrivals in the United Kingdom	234,748

In regard to air travel between the United Kingdom and places beyond Europe, a significant item of information recently issued by the Board of Trade is that in the first nine months of 1947, the number of passengers travelling to or from North America by air was roughly half the number travelling direct by sea.

The aerial transport of overseas passengers has an important connection with modern port operation. This is referred to later under the heading of "Facilities to be provided."

Characteristics of Passenger Ports

Generally speaking, the regular passenger traffic of the United Kingdom is concentrated at a comparatively few specialist ports.

The reasons for this concentration are not far to seek. We should expect to find passenger facilities being provided at a port in close proximity to a densely-populated area. London and New York are outstanding examples. The underlying factor is the reduction of land travel to the minimum.

Again, we should not expect to find ocean passenger traffic developing at a port remote from the established trans-ocean routes. The great liner companies naturally desire to avoid unnecessary hours of steaming in home waters—and this view is, just as naturally, shared by the passengers. As a case in point, the development of Southampton doubtless owes much to its advantageous position in relation to the established liner routes. Plymouth has attracted a certain amount of passenger trade for the same reason. Many passengers for London disembark at Plymouth and continue their journey by train.

The size of the port and the amplitude of its general port facilities are other factors. World passenger liners are big ships: only the few largest ports can take them at all: passenger facilities are developed at such ports, and, being thus provided tend to attract also such smaller vessels as may require passenger facilities.

Dry dock accommodation is also an important point. A port authority which has available or is willing to provide the sizeable graving docks required by great liners is likely to find that the companies owing the ships will attach great value to such facilities.

Finally, tradition and long usage play their part. Once a passenger Liner Company has established itself at a particular port, it tends to grow into the port, and the port itself tends, in some degree, to grow around the Company with its particular needs and special ships. The great Liner Companies with their extensive shore establishments are complex organisations, not to be disturbed or transplanted except for very weighty reasons.

Facilities to be Provided

A port proposing to deal with regular ocean passenger traffic must be able to offer the following facilities:—

(1) **A deep-water berth for every vessel.** Preferably, the berth should be alongside a tidal quay, pier or landing stage, that is, not within enclosed docks. This assists the maintenance of scheduled arrivals and departures because no waiting for the opening of dock gates is involved. On the other hand, the provision of open berths most often involves deep original dredging and expensive maintenance dredging. Also the problem of tidal rise and fall has to be dealt with. Again, some open berths are apt to be less comfortable than berths in enclosed docks. Nevertheless, the advantages of open berths for passenger liners are very marked and their use is almost universal. The vessel should have room to swing in the vicinity of the berth.

(2) **A Quay, Pier or Landing Stage.** The quay buildings are dealt with below, but between the buildings and the quay edge, there should be sufficient open quay deck to accommodate two railways (for cargo work), cranes and crane tracks, bollards and capstans. The railways and crane tracks should be flush with the quay deck and there should be at least one clear area left available for the parking and slinging or unslinging of motor cars (and other vehicles) requiring to be shipped or landed. There should be an unobstructed approach to this area. At many places, the vessel will wish to load or discharge some cargo in addition to passengers. This requirement must be borne in mind, and a sufficient provision of cargo-handling facilities should be included in the layout accordingly.

Port Operation—continued

(3) **The Quay Buildings.** At passenger quays, a dual purpose main building is not uncommonly provided. It has the normal characteristics of transit sheds as well as subdivisions for passenger handling. From the point of view of cargo-handling it may have landing platforms, of rail wagon height, along the front and the rear. If so, the needs of passengers will be borne in mind, and steps will be cut through the platform, at convenient places opposite the ship on the quay front side. A Customs lock-up cage is another common feature to be found within the shed.

The special sub-divisions of the building peculiar to passenger traffic are:

1 The steamship company's Shed Office and ticket collecting arrangements.
2 An Immigration Department control room through which passengers must pass.
3 Arrangements for baggage examination by H.M. Customs.
4 A waiting room for passengers.

The rear platform of the shed is used as a railway platform for passengers arriving or departing by specially worked trains (or through-coaches) timed to fit in with the steamer's advertised sailing or arrival.

The special port facilities required by flying boat services also call for mention. At Southampton, for instance, flying boat services of the British Overseas Airways Corporation are available for passengers to or from Australia, Africa, India and Hong Kong. Eventually, a service to and from the United States of America will be instituted.

An airport terminal has been constructed at Southampton Docks which will be equipped on the waterside by two "U" shaped pontoons for the reception and mooring of flying boats. The air liners will alight on Southampton water and taxi to the pontoons. They will depart by reverse procedure.

Passengers, mail and freight will be handled in the terminal building which will be equipped with Customs examination rooms, buffet and rest rooms. A railway platform alongside the terminal will accommodate special trains operating to and from London. The Customs and Immigration procedure will be as later described for steamship traffic.

Last year (1947) a Swedish air line began the practice of flying crews to Sunderland to join new ships. The flying boats alighted in the Outer Harbour and taxied to moorings in the River Wear.

There are two airport wharves at the Port of Belfast.

The harbour at Foynes, County Limerick, is now used as a base for flying-boat mail and passenger service. Seaplane moorings are provided at Stranraer, Wigtownshire.

Ownership of Facilities

The static facilities, as described above, are normally provided and owned by the port authority owning and operating the general port facilities. A typical instance would be that of a steamship company already running a passenger service to a particular U.K. port and desiring to improve it to cope with an expanding trade. The passenger service might have developed out of a cargo service and the old berth have thus become unsuitable for the new and growing need. Faster and bigger ships may be in contemplation. The Steamship Company approaches the port authority and the latter agrees to construct a new berth or to adapt an existing berth and to embody in it all the special features requisite for the smooth handling of passenger traffic, and perhaps, a certain amount of cargo trade as well. In return, arrangements may be made between the Port Authority and the Steamship Company for the repayment of capital outlay over a period of years. In such cases, the berth or quay will probably be appropriated to the exclusive use of the Company except at special times by mutual arrangement.

The Steamship Company discusses in principle special trains or through-coach arrangements with the Railway Organisation and reaches general agreement with them and with the Port Authority.

Aliens Order, 1920

The control of possengers seeking to enter the United Kingdom or embark for a foreign destination is vested in Immigration Officers appointed by the Secretary of State under powers derived from the Aliens Restriction Acts, 1914 and 1919, and the Aliens Order, 1920 (as amended). At ports where no Home Office staff is stationed the duties are carried out by officers of the Waterguard Department of H.M. Customs. The Aliens Order prescribes that an alien shall not land or embark in the United Kingdom except at an Approved Port. (Article 1 (1) a., 1 (b), and 3 (2)). Such ports are listed in a schedule attached to the Order. The Secretary of State, however, reserves the right to approve the use of non-approved ports in certain circumstances.

Masters of ships have certain powers and obligations. Under Article 15 (3) they may detain on board any person, whether passenger or member of the crew, until inspection by the Immigration Officer has established whether or not he is an alien. Article 5 requires them to make prescribed returns of alien passengers and members of the crew and passengers and members of the crew must furnish the necessary particulars to enable the Master to make the return. Article 15 requires that every person landing or embarking in the United Kingdom (other than a person under the age of 16 years) shall have with him either a valid passport furnished with a photograph of himself or some other document satisfactorily establishing his national status and identity. It follows that the obligation to prove his nationality to the satisfaction of the Immigration Officer rests on the passenger or member of the crew. Therefore although a British subject does not require leave to land or embark he must produce his passport to an Immigration Officer in order to conform with Article 15 as above.

An alien requires the leave of an Immigration Officer both to land and embark (Articles 1 (1) a, and 1 (b)), certain diplomats being exempted from the provisions of the Order (Article 22).

The Routine

The operational purpose of the various facilities at an embarkation berth may perhaps best be seen by following an imaginary passenger going aboard.

He is a British subject resident in England. He applies to the head office of the Steamship Company, or to their branch or agents at the embarkation port or to a travel agency anywhere, asking for a berth on a ship to sail on or about a certain date to a named foreign port. As the principal preliminary recording is usually done in the office of the Company's Agents at the port of embarkation, we will trace the enquiry there.

In that office, a file will probably have already been started in connection with this particular sailing which is to occur some weeks or months ahead. There is a file for every separate sailing up to six months ahead or longer. The master document on each file is a berthing list which is gradually filled up, altered and filled up again, as the weeks go by. All correspondence connected with this one sailing is filed together.

If there is a berth vacant, of the class required, the agents inform the intending passenger accordingly and tell him the price. At the same time, they draw attention to the following matters:—

(1) He must hold a valid passport. It may require to be viséd. If so, he must attend to this matter.
(2) He must be prepared to produce his ration book and identity card upon embarkation if going abroad for over 3 months.
(3) How and where to book for his railway journey to the ship.
(4) Particulars of any special trains or through-coaches.
(5) He is advised to travel with his luggage. If, however, he must send any luggage in advance, he should despatch it at least one week before sailing date. In either case, every piece must be labelled (preferably with the Steamship Company's own labels, as supplied), showing his name, the ship's name, the sailing date, and his intended address abroad. Luggage in advance must be consigned to the Railway Station at the ship's berth, and the Agent's office must be advised accordingly.
(6) He will have to pass through the Immigration Authorities Control at the berth before embarking.
(7) He will have to pass all his baggage through the Customs at the berth before embarking. He must not take with him jewellery or valuables exceeding £100.

Port Operation—continued

(8) In currency, he will be limited to £5 in sterling notes and £10 in foreign notes. He will be questioned on this matter and possibly searched. He may take in addition any Travellers Cheques obtained through a Bank.

(9) Dogs or other animals must be booked in advance and special permits obtained, viz., a Veterinary Certificate, Consular endorsement and an Import Licence from the foreign country.

(10) Travellers coming by road must arrive not later than a certain (named) hour. (This is to avoid confusion with the passengers arriving by train).

(11) Travellers wishing to take motor cars with them must say so when booking cabins. Such cars must be alongside steamer not later than a certain (named) hour. Car owners may make arrangements (through the A.A. or the R.A.C. if they like) whereby a motor car may be taken abroad and brought back again under duty-free conditions. Officials of these Associations will be at the berth to attend to the handling of cars and the necessary clearance and documentation.

(12) He should consider insurances, e.g., baggage, personal accident, life. The Agents will answer any enquiries on these matters and deal with them.

The passenger accepts the booking offered, sends his cheque and receives in exchange his steamship ticket. He decides not to take a motor car, to travel with his luggage as advised, and to proceed to the port of embarkation by rail. He notes that on the intended date of sailing, a number of through-coaches will be attached to a certain train leaving London for the port of embarkation. He plans to proceed by rail via London accordingly.

He visits his bank, explains the object and probable duration of his intended journey, and applies for a certain amount of money in Traveller's Cheques. His application is passed through the necessary stages and may be granted in whole or in part. In due course he is supplied with some cheques. He also obtains, if he can, £10 in such foreign notes as may be useful to him. He sets aside £5 in sterling notes, also, to take with him. Lastly, he understands (although nobody has officially told him) that he may also take with him £2 of English silver money. He puts this ready also.

On the day before embarking, he packs, labels and addresses each piece of his luggage.

Next day he proceeds to his home railway station, taking his luggage with him. He takes his railway ticket, his steamer ticket, his passport, the money and cheques above-mentioned, and sufficient additional money (but no more than sufficient) to get him to the boat. He does not take his ration book or identity card because he will not be abroad for so long as 3 months. He proceeds by rail to London.

He changes trains in London and joins the boat-train.

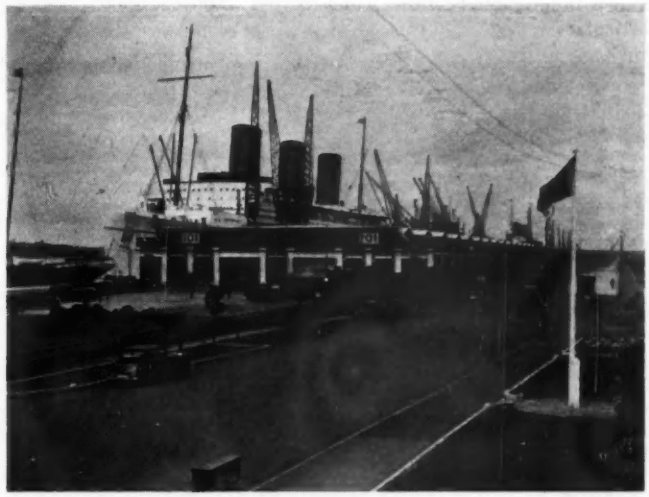
He finds and claims a seat in one of the through-coaches and then sees his luggage into the van. The door of the van is chalk-marked with the name of his ship. He boards the train and the journey begins.

At the town station of the port of embarkation, the through-coaches and vans are shunted, picked up by a pilot engine and taken down the special branch serving the Quay Railway Station. (In the case of a complete boat-train, the shunting and change of engine would not be necessary). At a point on this journey, the train crosses the boundary which separates the railway property from the port authority's estate and shortly afterwards the train pulls up at the platform which runs along the rear of the Embarkation Shed.

Baggage porters (employees of the Dock Authority or Steamship Company's Agents) unload the vans, stack the baggage on to trolleys and take them through the "Baggage only" door into the shed. Uniformed attendants (employees of the Steamship Agents) direct passengers to other doorways marked, variously, with the name of a ship and the Class of travel.

The passenger we are following now finds himself in a waiting room containing a queue passing into a partitioned office staffed by the Steamship Agents' booking clerks with the Ship's Purser also in attendance. The passenger produces his steamship ticket and the clerk checks it against the Berthing List and gives him a Cabin Card in exchange for his ticket. He recommends the passenger to have his passport and currency ready and passes him on to the next room.

Here the passenger finds a number of Immigration Officers each interviewing passengers. He approaches the first one to be disengaged and is asked to show his passport. This is produced, checked, and returned to him. He is then asked to produce his note currency, sterling and foreign, and this is counted and returned to him. Finally, he is asked if that is all the money he is carrying and he mentions the loose silver. Any passenger is liable to be further questioned or even searched but the Immigration Staff are experienced men, of great tact who make a point of easy courtesy with all save the suspected wrong-doer. With this sort, their attitude is firmer—and they generally know. Somewhere near at hand, there is usually a member of the C.I.D. as well as uniformed Police.



View of Dock Extension, showing Herbert Walker Avenue, Southampton.

The passenger now proceeds into the Customs Examination Hall. He will find himself walking up to a long bench behind which a number of Customs Officers are standing. Over the head of each of them a notice board is suspended bearing two letters —for example "A to F." The whole range of the alphabet is covered in this way and as our passenger's name is Clark he goes up to the officer standing under the "A to F" board.

Behind the Officers is a grill, painted on the floor of the shed, with sections and lettering corresponding to the notice board. The baggage is seen to be already placed out on this grill in accordance with the passengers' names as shown on the labels. The baggage porters who brought the luggage in from the arrival platform have sorted it on to the grill and are now standing by.

Mr. Clark has a short wait while his particular Customs Officer is dealing with an earlier passenger; and then he points out to the attendant baggage porter which bags are his. The porter brings them up and places them upon the bench between the officer and the passenger. The Customs Officer asks a few questions as to what the bags contain and the passenger opens them up for inspection if required to do so. The Officer chalk-marks each bag as he passes it and the baggage porter again takes charge of it. The passenger tells the porter his cabin number and the porter takes the luggage off the ship. He will take to the passenger's cabin such bags as he requires for his use on the voyage; if he has marked any "Not wanted on voyage" the baggage porter will put them aside with others to be hoisted on board by quay crane and stowed away by the crew.

Mr. Clark now walks through the police-controlled exit leading out from the shed on to the quay front and proceeds down the shed platform steps (if any), across the quay, and up the gangway on to his ship. At the head of the gangway he will be asked to

Port Operation—continued

show his Cabin Card. He does so and having been told how to get to his cabin he goes below. He finds his room and checks his luggage and is then able with a quiet mind to take his first walk around the ship. He has embarked.

Currency Restrictions

The currency restrictions mentioned above are applied by H.M. Treasury pursuant to the Exchange Control Act, 1947. They are described as they happen to be at the time of writing (March 1948) but they may possibly have undergone some modification by the time these words are read.

Non-British Passengers

In addition to complying with the above-mentioned formalities, a non-British passenger, before embarking, must also comply with the requirements prescribed under the Aliens Order, 1920. He will be required to fill up, sign and hand to the Immigration Officer, an Embarkation Card giving his complete personal particulars.

Passengers Disembarking at Docks Extension, Southampton.

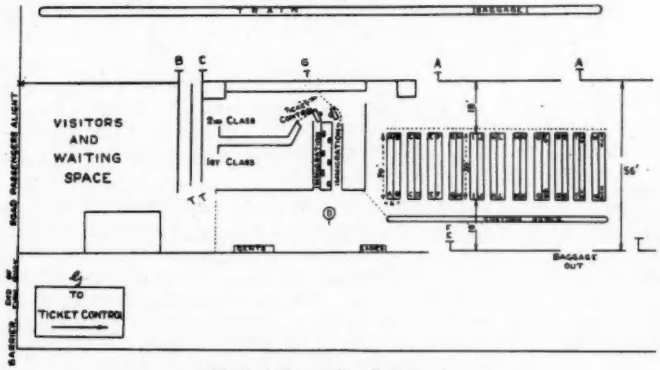
Disembarkation

On the way out of England, the intending voyager finds barriers between himself and the ship. The barriers are manned by friendly officials, anxious to help rather than to hinder, but they are none the less barriers and the control over them has to be complete. On the other hand, the returning traveller finds his way barred to the railway platform behind the shed or to the motor car that awaits him on the dock road beyond the shed. As it is the same shed, it will be seen that all the arrangements have to be designed with a two-way character, capable of being switched one way or the other according to requirements, but incapable of being used, for the time being, in any direction other than the proper one

This makes a nice problem in design and layout. It is surmounted at the lesser passenger ports by the use of moveable barriers constructed in convenient sections, moveable Customs benches, a number of moveable painted signs, the use of chalked signs where necessary, the presence of uniformed staff to assist and guide passengers and the provision of doors at each end of the control rooms which are themselves fitted with two-way counters.

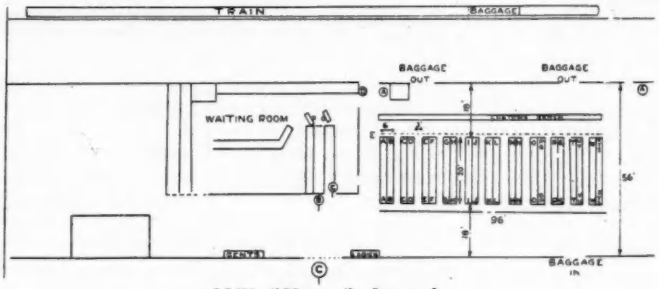
At the larger passenger ports, very complete two-way designs are a permanent feature of the facilities provided.

At the time of disembarkation, in addition to the inward Customs baggage check, and the inward Immigration check, the Port Medical Officer of Health has an important duty to perform. The Officers of H.M. Customs, Immigration Officers and Officers of the Port Health Authority board the vessel as soon as she comes alongside and nobody may disembark until the master of the ship has handed a Declaration of Health, covering all passengers, officers and crew, to H.M. Customs and received from them the permit to land known as " Pratique " (referred to in an earlier chapter). Cases of notifiable disease, if any, must be individually reported and the Medical Officer may modify the issue of Pratique accordingly. If necessary, he will examine the sick persons and arrange for their safe removal ashore for treatment. He has authority to require any person on board to undergo a medical examination before being permitted to leave the ship, and, in practice, examinations are frequently carried out—especially in the case of aliens wishful to come into Britain to seek employment or to take up a job. The object is to ensure, so far as possible, that they are in good health and therefore in no danger of falling ill and unable to work and thus becoming a charge upon the community.



M/V " Venus "—Outward.

A. Baggage Entrance (notice).
B. Passenger Entrance, 1st Class (notice).
C. Passenger Entrance, 2nd Class (notice).
D. Customs Examination Bench (notice).
E. Passenger Exit to Vessel (notice).
F. Have you claimed and cleared your baggage? (notice).
G. Ticket Control (notice).



M/V " Venus "—Inward.

A. To the Train (notice).
B. Rail tickets issued here (notice).
C. Customs Examination Bench (notice).
D. Please see your baggage on the train (notice).

Baggage is got up, re-labelled and removed ashore by baggage porters and/or cranes to the Customs Examination Hall.

Non-British passengers must fill up and have ready a landing card corresponding to the Embarkation Card previously described.

The Immigration Officers obtain passenger and crew lists from the Purser. Passengers are assembled in the most suitable public rooms and are interviewed individually by an Immigration Officer. As the only requirement of a British subject is to establish his nationality and this is done by the production of a passport, it is usual to segregate them from Alien passengers and thus effect speedy clearance. In fact many hundreds of British passengers can normally be cleared and ready to land long before the baggage has been taken ashore and assembled in the Customs shed. Alien passengers have to satisfy the Immigration Officer that they conform with the requirements of the Order and thus the examination takes rather longer, but even so it is exceptional if

Port Operation—continued

more than two or three minutes is spent over each normal passenger whose object is simply business or pleasure. A landing card, provided by the shipping company is stamped by the Immigration Officer and collected at the gangway when the passenger disembarks.

At Channel ports and airports, the examination of incoming passengers is carried out on shore, but until an alien has received formal permission to land from an Immigration Officer he is, in law, deemed not to have landed (Article 3 (2)).

The next move is through the Customs where baggage is examined, dutiable articles must be declared and paid upon, and every piece must receive the Officer's mark before being reclaimed by the baggage porters.

Once through the Customs, the passenger goes out through the Examination Hall to the railway platform at the rear of the shed. He buys his ticket and, if his train is in, he can check his luggage, see it aboard, and settle himself in his compartment. If the train is delayed—possibly by fog or other reason—he can spend the interval in the passengers' waiting-room in the Shed. Restaurants and bars are provided at the regular passenger ports.

Refreshment Room and Buffet, Docks Extension, Southampton.

Some Examples of Passenger Facilities

Southampton.

In pre-war days, Southampton dealt with 47 per cent. of the United Kingdom traffic in ocean passengers. In addition, between two and three hundred thousand travellers were carried annually between Southampton and Havre, St. Malo and the Channel Islands. Another 73,000 passengers embarked or disembarked at the docks in connection with cruising holidays.

There are more than twenty passenger-and-cargo sheds—some of them of great size. The berths are of the open type, with no locks to negotiate, and are located on the River Test, the River Itchen, the Empress Dock, the Outer Dock and the Ocean Dock.

The deepest berths have about 40-ft. of water at L.W.O.S.T. There are other berths with 34-ft. and 32-ft. The Outer Dock is the shallowest with about 18-ft. at low springs, with a rise of 13-ft. to give 31-ft. at high springs.

The passenger berths are directly served by the boat trains of British Railways (Southern Region). There are also air connections from the port to parts of England, Scotland and Ireland.

Passengers pass immediately from ship's gangway to the quayside sheds for baggage examination. The sheds have waiting-rooms, buffets, lounges, writing and reading rooms and postal facilities. There is a carriage-cleaning and warming shed at the new Docks Estate for the preparation of passenger coaches. Garage accommodation is available for passengers cars.

Flying boat facilities have been described earlier.

The Dock Authority at Southampton is the British Railways (Southern Region). The Dock Authority undertakes all the shore work and, in the case of Railway-owned cross-Channel vessels, the inboard work also.

The Dock Authority's operational preparations at Southampton are as follows:—

(1) Receipt of advice from the Shipping Company or Ship's Agents.
(2) Dissemination of information contained in the advice to all Dock departments concerned.
(3) Preparation of shed.
(4) Assessment of labour requirements.
(5) Assessment of train requirements.
(6) Provision of railway stock (by discussion with Waterloo) and arrangement of running times (with Southern Divisional Superintendent).

The following valuable notes, under the six heads above-mentioned, have been most kindly furnished to the Authors by the Dock Authority at Southampton, and are recommended for careful study by all students:—

Advice from the Shipping Company or Ship's Agents

Gives the following information:—

Name of vessel. Expected date and time of arrival. Number of passengers, first, cabin and tourists. Amount of baggage and how stowed, viz., holds, baggage room, cabin baggage, etc. Number of passengers expected to travel on boat trains. Mails. Specie. Special and general cargo.

Dissemination of Information

This information is disseminated to the various departments and sections who will be required to contribute some service or other towards the job, viz.:

Dockmaster for berthing arrangements.
Electrical Engineer for provision of cranes.
Outdoor Superintendent.
(a) **Wharfinger** for Quayside operations.
(b) **Traffic Controller** for Rail Movements.
(c) **Indoor Assistant.**
(1) **Staff and Labour** for provision of Clerks, Foremen, Checkers and Dock Labour.
(2) **General Office for documentation.**
(3) **Baggage Master.**
Commercial Superintendent for Rendering Dock Charges.

Preparation of Shed

Must be made spick and span. Clean and good appearance essential. Old cargoes stacked back.

Positioning of Hurdles and Barriers to provide pathways for passengers—avoids confusion. Also to keep passengers within bounds—no contact with friends or relatives before H.M. Customs formalities. The boat train area at the top side of the shed is hurdled off so that passengers proceeding by boat train must pass through the ticket barrier in proper manner. Compounds for visitors, etc., meeting passengers.

Positioning of low long trestle tables for Customs examination of baggage. Also desks for payment of Duty.

Positioning of Kiosks for Cables, Telegrams, Money Exchanges, Railway Ticket Office, etc.

Position of Baggage Scales, the baggage of each passenger travelling on boat train passes over the scales. Free allowances on boat trains:—150 lbs. First Class; 100 lbs. Third Class.

Labour Requirements for Passenger Traffic

Varies according to circumstances, viz.: quantity of baggage.

Maximum number of points from which baggage is to be discharged at one time.

Distance between point of discharge and centre of shed.

Method of operation, viz.: by quay cranes, or gravity chutes or baggage conveyors.

NOTE.—Some passenger movements involve all three types of operation, in addition to hand baggage brought to the bottom of the gangway by the ship's stewards.

Assessment of Boat Train Traffic

From the Shipping Company's advice the Dock Department are able to determine:—

(a) How many trains will be required.

Port Operation—continued

(b) The composition of the trains, viz.: 1st, 3rd class, Pullman cars, Restaurant and Kitchen cars, Luggage Vans, etc.

(c) Approximate times of departure.

Provision of rail stock. Dock Department arranges with Operating Superintendent at Waterloo.

Running times. Dock Department arranges with Southern Divisional Superintendent.

Provision of Stock

Sometimes the empty sets are sent to the Docks from the Main Line Depots. In many cases the Dock Department is required to provide stock from available stock within the Dock—ex.-Down Boat-train traffic. There is a railway carriage cleaning depot at Southampton Docks, thus avoiding considerable empty running to and from Main Line depots.

Facilities available at the Dock Carriage Sheds:—Washing-down, washing floors of carriages, cleaning windows and brasswork, brushing upholstery and dusting. Watering the trains. Gassing for cooking purposes in the kitchen cars. Steam heating in cold weather.

Gassing. The gas is received from the Main Line depot in rail gas tanks. From the tanks the gas passes into a compressor, thence into underground pipes to gas cocks which are installed at convenient points along the side of the tracks in the carriage sheds.

Steam heating. The depot is fitted with a boiler system. Maintained throughout the 24 hours of the day in winter time. The steam passes from the boiler through overhead pipes which are connected up to the steam pipes of the carriages.

The additional notes set out below deal with other important points in the arrangements prevailing at Southampton:—

Running Times of Boat Trains

Generally the passengers land about 1½ hours after the arrival of the vessel and the first boat train leaves about 1¾ hours after the landing of the passengers. With some operations the landing of the passengers must be staggered. Five or six boat trains may be involved. After departure of the first boat train the succeeding trains are usually scheduled to leave at 45-minute intervals. This is not only to allow for operations at the Docks but also to allow time for the clearance of preceding passengers in London (Waterloo).

Adjustments in Bad Weather

When shipping is delayed through bad weather, etc., the working programme must be adjusted. Sometimes the Shipping Companies are able to give early notification of the revised time of arrival. The organisation must be able, however, to cope with the changed circumstances at very short notice. There must be the minimum inconvenience to the passengers.

Factors to be Considered when Working Schedules cannot be Maintained

Revised timings of boat trains must be acceptable to Divisions for Main Line working. Can be a problem in peak periods when Main Line is working to capacity, such as at holiday time, etc.

Effect on Dock Internal working—there may be other passenger movements impending. Certain tracks on the Docks must be kept clear when boat train traffic is imminent. Normal freight train traffic and shunting may have to be adjusted.

Staff problems, involving extra hours of work over rostered times.

Baggage Handling

Electric trucks (2-ton capacity) with sufficient number of trays are used for the conveyance of the baggage from point of discharge into centre of shed.

Baggage is sorted alphabetically to first letter of passenger's surname. It is most important that disembarkation of passengers shall not commence until all baggage involved has been discharged and sorted.

It is the responsibility of the passenger, with the assistance of Dock Labour, to clear his or her baggage through Customs or to nominate an agent to clear and forward or house. Baggage left behind not cleared is removed to the Dock Authority's Bonded Baggage Warehouse.

The clearance of passengers is dependent upon H.M. Customs requirements, and the Customs Authorities do all they can to co-operate with the Dock Authority to promote smooth working. Each passenger's baggage is dealt with separately, being removed from the Customs bench after clearance and conveyed on hand trucks, either to:—

(a) Baggage scales and thence to boat-train luggage vans, or,

(b) to Car and taxi-loading bay.

When attending on passengers all Dockers wear numbered armlets. Baggage is stowed in the Luggage Vans of boat-trains to alphabetical groups—usually three, A—H, I—P, Q—Z.

Control of Road Vehicles

A strict control must be kept on the movement of taxis and private cars. They must not be allowed to congest the Shed. There is an arrangement at Southampton Docks whereby private cars meeting passengers, and taxis, are called up from the car parks outside the Sheds by a loud speaker system.

The summary below relates to a representative passenger vessel handled at Southampton:—

Handling of Passengers and Baggage at Southampton Docks

2,200 Passengers.
11,000 to 12,000 pieces of baggage.
1,600 Passengers by boat train to London.
200 by Private Cars.
300 by Taxis to town Station for places other than London and to local points.

Vessel arrived	3.15 p.m.		
Gangway In	3.20 p.m.		
Discharge of Baggage commenced	3.30 p.m.		
1st Class passengers commenced to land	4.55 p.m.	Boat Train departed ...	6.25 p.m.
		Boat Train departed ...	7.20 p.m.
Cabin class commenced to land	6.30 p.m.	Boat Train departed ...	8.10 p.m.
Tourist class passengers commenced to land ...	7.50 p.m.	Boat Train departed ...	9.07 p.m.
About 500 passengers remained on board for the night. These passengers (all classes) landed at	8.00 a.m.	Boat Train departed ...	9.20 a.m.
Private cars meeting passengers	201		
Taxis	307		

London.

The passenger landing-stage, opened at Tilbury in 1930, is 1,142-ft. long by 80-ft. wide, with a depth of 35-ft. L.W.O.S.T. alongside. The stage is a floating structure and can be used at any state of the tide. It has ample access by bridges and gangways for passengers and vehicles to the Customs Baggage Examination Hall on shore and with Tilbury Station, from which special boat trains are run to St. Pancras and Fenchurch Street.

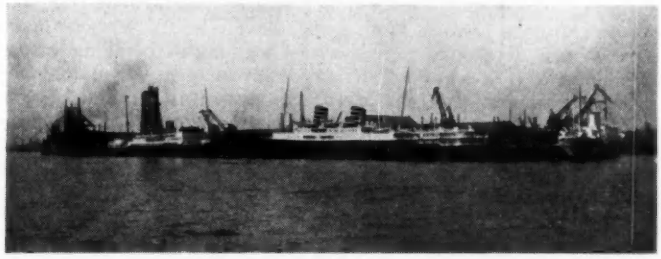
Liverpool.

Passengers at Liverpool are embarked and disembarked at Princes Landing Stage which is a floating structure in the River Mersey carried on a large number of iron pontoons. It forms part of a larger floating structure the full length of which is 2,534-ft., the southern part being reserved for ferry passenger traffic. The

Port Operation—continued

Princes Landing Stage, which is reserved for sea-going vessels, is 1,838-ft. long. A number of bridges and a floating roadway connect the Stage with the shore.

Ocean-going vessels come alongside the Stage on arrival at and departure from the Port at all states of the tide and embark and disembark passengers with their baggage, mails, etc. Two liners can be accommodated at one time and cross-channel vessels are also berthed at scheduled times.



Riverside Quay and Extension, Newcastle.

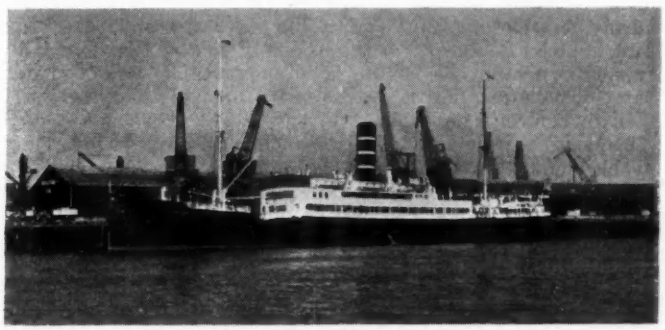
Facilities are provided for both coastwise and overseas passengers comprising two baggage rooms on pile structures which have baggage conveyors connecting them with the Stage. Passengers, either inward or outward, proceed through these rooms for the necessary customs and immigration examination. These baggage rooms have access on to a covered roadway on the further side of which is the Riverside Railway Station, from and to which trains are run in connection with ocean-going traffic. The lines from this station connect with the main line to London and elsewhere. In addition to the above, there are waiting rooms for both ocean-going and coastwise passengers and facilities such as a buffet, baggage offices, post office, telephones, lavatories, etc., in convenient positions. Accommodation for customs and immigration examination is, of course, provided in consultation with those authorities, and every effort is made to meet their requirements and to make such arrangements as will lead to the speediest handling of passengers and be most conducive to their comfort.

The Port Health Services work under the City Authorities and contact vessels by arrangement with shipowners in the river or on arrival at the stage according to the particular circumstances.

As regards the use of the Riverside Station the Mersey Docks and Harbour Board have mutual arrangements with the Railways Executive (London Midland Region) and whilst the Board own the station and railway lines across their Estate and are, in effect, the responsible authority, the Railways Executive work the trains in and out.

Newcastle.

Passenger vessels are accommodated at two deep water quays owned by the Tyne Improvement Commissioners and situate near



Tyne Commission Quay, Newcastle.

the Albert Edward Dock. Regular steamship services are operated to and from Bergen and Oslo. The sheds are of single-storey construction and the quays are equipped for cargo-handling as well as for passenger traffic. The depth of water alongside is about 25-ft. at low springs.

The sheds are arranged in accordance with the requirements of H.M. Customs and the Immigration Department and there is a direct passenger railway service to and from the Central Railway Station at Newcastle. Through-coaches via Newcastle are operated between London and the steamship berths.

Harwich.

Passenger facilities, owned by British Railways, are situate at Parkeston Quay which is a tidal wharf on the Rover Stour, 4,000-ft. in length. Depth of water alongside is 16 to 20-ft. at low springs.

There are complete arrangements at the berths for passenger train working, and for Customs and Immigration controls. There is a scheduled boat-train service with London.

The principal steamship connections are with the Hook of Holland, Flushing, Rotterdam, Antwerp, Zeebrugge and Esbjerg.

Dover.

There is a Marine Railway Station with five steamship berths alongside for Continental passenger traffic. The depth of water at these berths is 20 to 30-ft.

Plymouth.

Plymouth has an ocean mail and passenger landing pier with 19-ft. of water at low springs. Liners are met in the Sound by tenders for the disembarkation of passengers, baggage, mail and specie. There are waiting rooms and baggage warehouses for Customs examination.

Other Passenger Facilities.

There are berthing and landing arrangements for smaller passenger steamers at many other places in the United Kingdom. The accommodation is usually either a tidal quay or a pier in tidal water. Such places include Bangor, County Down, Beaumaris, Anglesey, Blackpool, Bournemouth, Brighton (with two piers, four berths and services with Havre, Cherbourg, Deauville, Calais, Boulogne and Trouville), Guernsey (and other places in the Channel Islands), Cork, Folkestone (for Boulogne service), Gourock, Herne Bay, Heysham (with 3,000-ft. of quay and a passenger station); Holyhead (with 7,908-ft. of quayage); Lymington, Margate, Ramsgate and Weymouth.

Acknowledgements and Further Reading.

In preparing the foregoing notes, the Authors have been much indebted to the port authorities at Southampton, London, Liverpool, Harwich, Newcastle and Dover, for information specially supplied. They have also made use of the excellent Official Handbooks published by the principal ports; and they have obtained useful information from "Ports of the World, 1946," published by The Shipping World, Ltd.

(To be continued)

Proposed Improvements at the Port of Dundee

The promotion of a provisional order to obtain powers to borrow £400,000 has been agreed to by the Dundee Harbour Trustees. The total projected expenditure is £499,000, but from this figure there has to be deducted the sum of £99,000 for unexercised borrowing powers for which Parliamentary sanction has already been granted. The expenditure contemplated includes £160,000 for a new motor ferry vessel similar in design to the M.V. *Abercraig* and having Voith Schneider propellers and radar equipment; £15,000 for spare Voith Schneider propellers for the motorship *Abercraig* and the new vessel; £307,000 for alterations and improvements to the ferry piers at Dundee and Newport and the provision of new offices at Dundee; and £17,000 for radar equipment. It has also been agreed that as soon as authority is obtained from the capital issues committee with regard to the unexercised borrowing powers, the specifications and plans for the new ferry will be issued and tenders invited.

Dock and Quayside Lighting

By C. H. NICHOLSON, M.I.E.E., M.I.Mech.E.

(Continued from page 296)

Electrical Distribution System

Whilst for small lighting installations the question of electricity supply calls for little comment, the power requirements of a dock lighting system, often absorbing 1,000 kw. or more requires careful planning, due regard being given to the economics, voltage drop and reliability. Except where a system of separate lighting feeders and distribution is adopted, the primary lighting distribution may be regarded as part of the main power distribution, what may be regarded as the secondary distribution being given from selected points on the main power service.

Ring mains for joint power and lighting service or for lighting supply only may have supplementary feeders connected thereto at points where the greatest load occurs. The system then may be referred to as the inter-connected feeder system.

At all points where a service for a group of lighting units is taken from the main system, switching arrangements should be such as to allow for disconnection of a ring main section, interconnection or feeder in order to give maximum protection against failure, and facilitate repairs without complete shut-down of the lighting service being necessary.

There are three general methods of providing electrical destribution from dock lighting (a) from lighting feeders, (b) from main power ring mains, and (c) from lighting ring mains. The latter method is probably the most satisfactiry, from a technical point of view, as it gives the greatest protection against failure but is the most costly.

Where 3-wire D.C. or 4-wire 3-phase A.C. distribution is adopted, some regard to balancing of the lighting circuits should be given, and links only should be inserted in the main neutral wire circuit. The advantage and disadvantages of the three systems (a), (b) and (c) are given below:

	Disadvantages	*Advantages*
(a)	Costly, no alternative supply in the event of a feeder failing. Voltage drop is a maximum for a given size of cable.	A fault on a section is isolated to one feeder only.
(b)	A fault on a sub lighting feeder may interfere with power service. Failure of power service extinguishes lighting. Lighting subject to voltage drop due to power demands on feeders.	Least costly to install. Gives alternative service if portion of ring becomes faulty provided ring main has isolators installed.
(c)	Costly to install.	Affords alternative service in the event of a portion of the ring main becoming faulty. Voltage drop in comparison with (a) is reduced by reason of the ring main system. Lighting is independent of power service. Voltage drop is independent of power demand.

A further method sometimes used for long-distance roadway lighting is to directly tap off the lighting units through fuses and switches from a secondary 3 or 4-wire feeder. Depending upon whether the supply system is D.C. or A.C., this reduces the size of cable required for a given voltage drop and is more often used on overhead systems than on underground.

The choice between underground or overhead cable systems is dictated by the conditions appertaining on site. A quay, for example, owing to the operation of cranes, cannot be served by an overhead system, whereas for marshalling yards and sidings, the overhead method has the advantage of obviating the necessity of laying cables under or alongside railway tracks.

The overhead system where this can be adopted has the further advantage of greater flexibility, i.e., additional lighting points can be installed with greater facility and at less cost than in the case of the underground system. In general, it may be observed that for roadways, quays, coaling appliances, the electricity services may be given by underground cables, whilst for long marshalling yards and sidings, the overhead system has advantages. It should be observed, however, that the overhead system is more liable to damage due to wind pressure, ice loading, travelling crane jibs, etc.

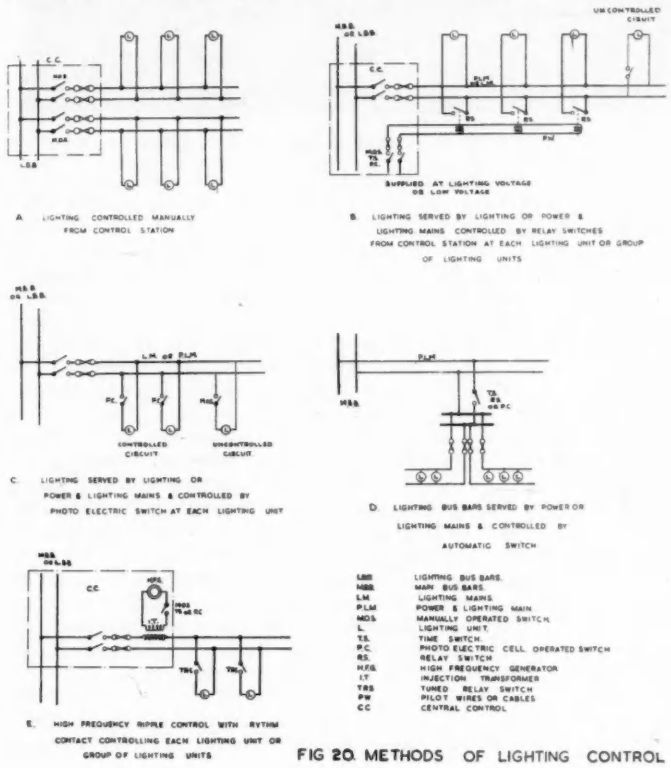

A. LIGHTING CONTROLLED MANUALLY FROM CONTROL STATION
B. LIGHTING SERVED BY LIGHTING OR POWER & LIGHTING MAINS CONTROLLED BY RELAY SWITCHES FROM CONTROL STATION AT EACH LIGHTING UNIT OR GROUP OF LIGHTING UNITS
C. LIGHTING SERVED BY LIGHTING OR POWER & LIGHTING MAINS & CONTROLLED BY PHOTO ELECTRIC SWITCH AT EACH LIGHTING UNIT
D. LIGHTING BUS BARS SERVED BY POWER OR LIGHTING MAINS & CONTROLLED BY AUTOMATIC SWITCH
E. HIGH FREQUENCY RIPPLE CONTROL WITH RYTHM CONTACT CONTROLLING EACH LIGHTING UNIT OR GROUP OF LIGHTING UNITS
LBB LIGHTING BUS BARS.
MBB MAIN BUS BARS.
LM LIGHTING MAINS.
P.L.M POWER & LIGHTING MAIN.
M.O.S. MANUALLY OPERATED SWITCH.
L. LIGHTING UNIT.
T.S. TIME SWITCH.
P.C. PHOTO ELECTRIC CELL OPERATED SWITCH
R.S. RELAY SWITCH
H.F.G. HIGH FREQUENCY GENERATOR
I.T. INJECTION TRANSFORMER
T.R.S TUNED RELAY SWITCH
P.W PILOT WIRES OR CABLES
C.C CENTRAL CONTROL

FIG 20. METHODS OF LIGHTING CONTROL

Methods of Lighting Control

Dock lighting installations usually require a system of control to ensure that lighting in offices, warehouses, silos, conveyor tunnels, etc., may be used at any time by manual switching, and roadway, marshalling yard and siding lighting is only available during hours of darkness. It is possible, of course, to individually manually switch outside lighting at the appropriate times, but for a large installation this is an expensive method, and therefore, automatic control is desirable.

The means of providing separate switching of the outside lighting may be summarised as follows: The provision of entirely separate electric supply mains for the outside lighting only, this being the most expensive method, the use of time switches, photo electric cell switches or relay switches (involving pilot wires) controlling each outside lighting unit, which again is an expensive method and further, may involve considerable maintenance.

A further method not involving the use of pilot wires is the installation of ripple control, or D.C. Bias Control which, however, does involve the use of a special relay at each lighting unit, or lighting supply point.

A greatly used method of control is the provision at selected points on the main power and lighting mains of control pillars for groups of lighting units, the bus bars serving the lighting system being duplicated, one for the uncontrolled lighting and one for the

Dock and Quayside Lighting—continued

controlled lighting; a pilot wire operated relay, photo electric switch, or time switch connecting the controlled bus bars to the main supply system during the hours of darkness, this being referred to as group control.

The various methods of control are shown diagrammatically in Fig. 20 (A to E), the electrical system adopted being 2 wire D.C. for simplicity.

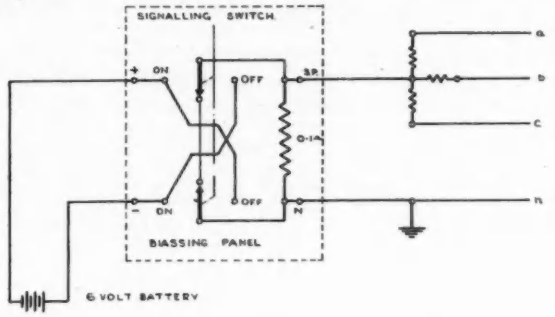


FIG 21A GENERAL SCHEMATIC OF SUBSTATION BIASSING EQUIPMENT

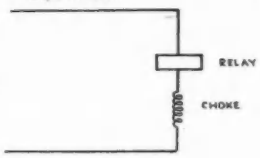


FIG 21B BASIC BIAS RECEIVING CIRCUIT

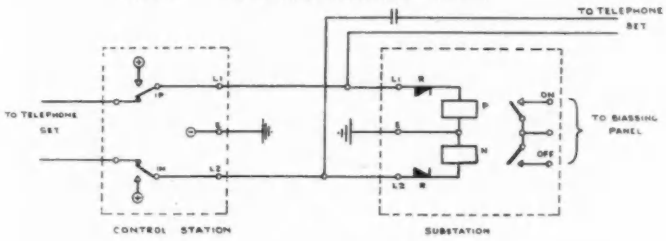


FIG 21C PROTECTED PILOT SIGNALLING SYSTEM

BY COURTESY OF STANDARD TELEPHONES & CABLES LTD

The Manual Control from a central point shown in Fig. 20 (A) calls for little comment except that as previously indicated separate controlled lighting mains are necessary, and hence the cost is high.

Relay Switch Control shown in Fig. 20 (B) has the advantage of not requiring separate mains, and can be operated from joint power and lighting mains. At each lighting unit or group of lighting units a magnetically-operated relay switch is installed, the operating coil of the switch being energised from the pilot wires or cables upon the closing of a manually-operated switch, time switch, or photo electric switch situated at a central control point. The electric service for the pilot cable may be at normal lighting voltage or low voltage. Where relay switches are installed for each lighting unit, the maintenance of these is a factor on large installations.

To obviate the use of pilot wires or cables the method shown in Fig. 20 (C) is available and requires the installatoin of a photo electric switch at each lighting point, the electricity service for the lighting being given from either lighting or power and lighting mains. The photo electric switch unit comprises a photo electric cell either of the selenium type or the emissive type mounted at the top of the lighting standard. When natural illumination rises or falls above or below a prescribed value, the cell actuates a magnetic switch through the agency of a valve amplifier switching on the lighting at dusk and switching off at dawn.

Group Control which is probably the most used is shown in Fig. 20 (D), the actual switching operation being carried out by time switch, photo electric switch or pilot relay.

Ripple Control. A further method of control which has been developed with a view to obviating the use of pilot wires and cables, photo electric switches and time switches is the Ripple Control System shown in Fig. 20 (E). High frequency currents in the range of 1,500 cycles per second and having two or more ranges of frequency are injected into the lighting or power and lighting mains by an injection transformer, the current being supplied by a high frequency generator which may be of the spark gap, valve or rotating type. Relays tuned to operate at the frequency injected into the system control each lighting unit or group of lighting units; hence, to " light up " a frequency of say 900 may be injected, this causing the tuned " lighting up " relay to close and energise the operating coil of a magnetically operated switch which is then latched in automatically. In order to extinguish the lamps a frequency of say 1,500 is injected, this causing the tuned " extinguish " relay to open the switch.

D.C. Bias Control

This may be carried out in two ways, first, by causing D.C. Bias to be injected into the Low Tension Network or by the use of pilot or telephone lines carrying the D.C. control current.

Dealing with the first method, the application of the D.C. Bias System to 3-phase or four wire networks will be considered as these are most common though the principle is the same for any system with a balanced neutral. The function of any means of signalling over distribution networks is to provide signals at all parts of the network which are readily received and easily used to control the selected apparatus.

It is therefore most convenient to receive the control signals over the same wires that are used to connect the selected apparatus to the supply mains, and as most of the network load is connected between phase and neutral the signals should be received between phase and neutral.

Solution of the Problem.

To achieve this aim the most convenient way to connect the bias into the network is between the star point of the supply transformer and the distribution neutral as shown in Fig. 21 (A) by means of a biassing panel. In the normal position of the biassing panel a short circuit is maintained between the star point of the distribution transformer and the network neutral to carry the out of balance current of the sub-station. To connect the bias into the network the signalling switch is moved into the ON or OFF position depending upon the signal which is to be transmitted. In the ON position the short circuit is replaced by the 6-volt battery to give positive on the star point and negative on the neutral, and as the D.C. resistance of the phase windings of the supply transformer is low compared with that of the supply conductors and network load, there will be 6-volts D.C. between all phases and neutral. Thus by switching a 6-volt battery in the star point-neutral lead of the sub-station, a D.C. signal has been established between all phases and neutral. This has all the advantages stated above as the switching equipment is at earth potential and is in a circuit where the current compared with the normal phase currents is low. Also the signal is effectively in parallel with the A.C. supply so that a short circuit or open circuit on the signalling system also shows up on the A.C. supply. The earth on the neutral must be in the position shown and not on the transformer star point as in this latter case any earth on the neutral will put an unknown resistance across the 6-volt battery.

Use of Resistance to Safeguard Neutral Connection

During the operation of the signalling switch the neutral is open circuited for a short interval (about .020 seconds) so a 0.1 ohm resistance is fitted across star point and neutral to carry the out-of-balance current for this interval. The use of this resistance has been approved by the Electricity Commissioners for this purpose.

Positive and Negative Signalling

By operating the signalling switch in the other direction the battery is connected into the network with the reverse polarity. Thus with the simple equipment two signals have been obtained using the two-battery polarities with respect to the network. This is the basis of the street lighting system as all " ON " signals are

Dock and Quayside Lighting—continued

of so-called " positive " polarity (positive of bias to phase, negative to neutral) while " OFF " signals are of " negative " polarity (negative to phase, positive to neutral). These simple signals are extended by using either a short signal or a long signal to give a total of four signals using polarity and time discrimination. Further extension of the signalling system is obtained by using the Multi-service system.

Description of Biassing System

The Biassing Panel which connects the D.C. Bias into the distribution network has therefore to perform the following functions:

1 To maintain a circuit from the star point of the distribution transformers to the network neutral which will carry the maximum out of balance current and withstand the maximum fault which will occur under the worst conditions.
2. To replace this short circuit by a heavy duty battery with the minimum disturbance to the neutral connection of the sub-station.
3 To be able to connect the battery into the network with either polarity.

Reception of the D.C. Bias

The problem here is to receive a D.C. Voltage ranging from 6-volts to 2-volts which is super-imposed on a 230-volt A.C. supply appearing between phase and neutral of the network. This is achieved by using the circuit shown in Fig. 21 (B), consisting of a relay and choke connected in series across line and neutral where the impedance of the choke keeps the A.C. current through the relay to below 5 milliamperes which is less than the operating current of the relay. When the D.C. Bias is applied the D.C. current saturates the choke, thus increasing the A.C. Current so that the combined effect of the A.C. and D.C. operate the relay. As the inductance of the choke is high the current in the relay rises slowly so that the relay may take up to two seconds to operate when the bias is at the minimum operating figure for the unit.

D.C. Bias for the Control of Lighting Systems

General.

For convenience the main elements of the D.C. Bias System will be described to give a complete picture of the system as applied to the control of street lighting.

The D.C. Bias Signals are connected into the L.T. network at each distribution sub-station by Biassing Equipment connected between the star-point of the distribution transformers and neutral of the network. In the normal position of the equipment a short circuit is maintained between star point and neutral to carry the out-of-balance current of the sub-station, this short circuit being replaced by a 6-volt heavy duty battery while signalling. As the D.C. Signals cannot pass through the distribution transformers, Biassing Equipment is needed in every sub-station in the area to be controlled by the D.C. Bias system.

Control Equipment.

The simplest form of control is to use time switch control of each sub-station by adding to each biassing panel a Sub-station Lighting Control Unit together with the necessary time switches. The operation of the time switch contacts is used to start the lighting control unit which operates the biassing panel to send out the D.C. Bias Signal corresponding to the time switch operation. The lighting control unit consists of a motor unit and relay unit mounted in two sealed glass-covered plug-in units. These two units are plugged into Jacks mounted on a steel panel which is bolted to the biassing panel. There is sufficient space to mount two 10-amp time switches on this steel panel so that the whole equipment consisting of biassing panel, lighting control unit and time switches, is mounted as one unit. This method of control provides a very inexpensive and reliable system for the control of lighting, where centralised control is not required.

If centralised control is required, then the sub-stations have to be connected to the central control point of pilots.

Where the pilots are only used for the D.C. Bias System the Central Control Equipment consists of a Master Lighting Controller. This unit consists of a power supply unit to give 50-volts D.C. from the normal A.C. supply, a motor unit for timing signals and a relay unit which controls the timing motor and connects the 50-volt D.C. supply to the pilot lines. Auxiliary time switches are used which operate this control unit to give automatic control of the street lighting. Manual push-buttons are provided on the unit to give emergency hand control of the system. This unit is suitable for the operation of up to 25 sub-stations in parallel, a subsidiary power unit being required if more than this number are involved.

Where several pilot circuits from the central control point are used, a Pilot Line Unit should be installed between the Master Lighting Control Unit and the pilots to give line testing facilities for short circuits between lines and for line to earth faults. The pilot line units are made in sections, each of which will handle up to six pilot circuits and is complete with test keys and meter for indicating the state of the pilot insulation. When a signal is to be sent, relays inside the Pilot Line Unit disconnect the outgoing pilot lines from the test keys and connect them through to the Master Lighting Control Unit. Faulty Pilot Lines can be disconnected by operating the appropriate line key.

Where telephony (Fig. 21 C) is required over the D.C. Bias Pilots, the Central Control Equipment consists of a Master Lighting Control Unit, a Pilot Line Unit, as described above, and a Telephone switchboard. The telephone system is local battery-operated with magneto ringing and the switchboard consists of a wooden cabinet fitted with drop indicators to tell which line is calling and keys for inter-connecting the various lines together with a telephone set and hand-ringing generator.

The writer is indebted to Messrs. The General Electric Co., Ltd., Messrs. The Benjamin Electric Co., Ltd., The Electric Lamp Manufacturers Association (E.L.M.A.), and Messrs. The Standard Telephone and Cables, Ltd., for the use of the technical data they have kindly provided.

The British Standards Institution

Re-Issue of Handbooks on Packaging for Export

The British Standards Institution recently decided that one way in which the Institution could be of immediate help to the export trade is by the re-issue of certain handbooks and technical documents, particularly those dealing with effective and attractive packaging of goods for export. Many manufacturers who have not hitherto been engaged in the export trade will no doubt welcome information as to the best method of packing goods for foreign markets, as the deterioration of products, owing to faulty packing, has often been commented upon during the last two years.

During the war, the Institution prepared a handbook on packaging and a supplement entitled " Recommendations for Preservation and Packaging for Tropical Theatres of War " (1943). Section 3 of the main Packaging Code deals specifically with Corrosion Prevention, but no attempt is made in this or the Supplement to cover every item sent to the tropics at that time, but it was the considered view of the representatives on the Committee that there was no item of service equipment for which there was not a parallel in the Supplement, and the Recommendations apply equally to similar peace-time commodities required by tropical countries or which in transit pass through the tropics.

Section 3 gives full information on the methods of packaging and on the types of preservatives required, whilst the Supplement is particularly valuable in its authoritative specifications and its details of the correct use of preservatives.

The handbook on packaging, which was prepared at the request of the Anglo-American Packaging Committeee of the Ministry of Production, is at present under review by Committees of the Institution, with the object of bringing it up to date so that it may serve as a guide to industry, and separate British standard codes will be issued in the near future.

Copies of Section 3 (price 6s., post free) and the Supplement (price 7s. 6d., post free) may be obtained from the Institution, 28, Victoria Street, London, S.W.1.

Delays to Road Vehicles at Liverpool Docks

Interim Report of Committee of Inquiry

An interim report of the Working Party appointed in connection with the delays experienced in the unloading of road vehicles carrying export cargo to the Liverpool and Birkenhead Docks was recently issued by the Mersey Docks and Harbour Board, at the request of the Ministry of Transport.

The Scope of the Problem

The report states that the problem was an old one which had been increasing ever since long-distance road transport became one of the principal methods of bringing export cargo to the port. The publicity which had been given to certain black spots had unfortunately conveyed the impression that all road traffic brought to the port for export was subject to intolerable delays in obtaining acceptance and clearance at the berths. This, however, was not the case, the great majority of the export cargo arriving by road being handled with reasonable promptitude. Undue delay occurred only in respect of certain berths when heavy loading for more than one ship was taking place. For this reason the black spots were liable to fluctuate and, at the present time, the only berths against which discrimination had been exercised by certain road hauliers, so far as was known, were the Australian and New Zealand and West African berths and Brunswick Dock (Harrison Line).

The Causes of the Problem and Suggested Remedies which have been Examined

There was no single cause of the trouble, but many contributory factors, the principal ones being:—

(i) The increased use of road transport.

(ii) The present condition of the port following extensive war damage.

(iii) The change of practice in ships loading full cargoes at a single port.

(iv) Delay in the arrival of a ship on a berth or the need for sudden repairs during loading.

(v) The volume of traffic in particular trades.

(vi) The operation of controls. licences, etc.

(vii) The tendency to ignore dates specified by the Steamship Company for the receipt of cargo at the berth.

(viii) The bunching of vehicles before work commences.

(ix) The problem of the vehicle with a number of small parcels for various ships or the vehicle with cargo for the same ship for various ports, complicated by mixed stowage on the vehicle.

(x) The customary method of unloading road vehicles.

(xi) Shortage of mechanical aids for assisting in handling of cargo.

(xii) The labour problem.

On the increased use of road transport, the Report points out that the best results can be achieved (labour being available) by the use of all forms of transport in their proper proportion but for reasons of speed and economy road transport had, during recent years, tended to oust other forms of transport to such an extent that over 70% of the export cargo shipped from the Port of Liverpool is now brought to the berths by this means. The problem was stated to be made more difficult owing to the present practice of the railways in refusing to accept traffic for a ship until a date has been agreed with the Shipping Company concerned, whereas road hauliers were frequently ready to accept traffic at any time.

No powers at present existed for the direction of cargo by a particular form of transport and the shipper or manufacturer was at liberty to choose whichever form suited him best. The Working Party did not consider it advisable to make recommendations in favour of compulsory control, nevertheless they were strongly of the opinion that shipowners and other parties concerned should urge consignors to consider the utilisation of alternative forms of transport where practicable in order to afford some relief to the quay position.

Barging to ships so as to relieve the quay position was still being considered by the Port Authority, but it had been reported to the Working Party that at a meeting of the Manchester Chamber of Commerce it was agreed that it was not possible to influence any further traffic by barge from the Manchester area owing to the smallness of the individual lots.

Discussions had taken place with a view to encouraging increased haulage of rail cargo to berth instead of this being carted from railway station so as to reduce the number of Railway Authorities' road vehicles proceeding to the berths, and all interested parties had promised mutual co-operation in this matter. The institution of one-way traffic was discussed at a meeting between the Police Authorities and the Shipowners using the berths, but it was finally agreed that the suggestion would not have the desired effect and the proposal was therefore dropped.

In spite of the limitations due to war damage and in order to relieve the position arising at Sandon Dock from the very heavy loading programme for Australia and New Zealand, the Port Authority had recently agreed to set aside part of a smaller shed as a reception depot for traffic from road vehicles. This depot has waterside accommodation and it will be possible to barge traffic to the ships for overside loading as well as to truck it to the loading shed.

The port suffered extensive war damage and the number of berths had been reduced by approximately 30%. This limitation made it impossible to provide relief by the regular allocation of additional loading berths to the same extent as before the war. It would be possible to do this again when the approved programme for construction of new sheds was completed.

As compared with pre-war, increased difficulties in the reception of export cargo were bound to be experienced owing to the fact that the size of vessels was still tending to increase and that ships now loaded full cargoes, whereas during the inter-war years they usually sailed only part loaded and their cargo was often collected from more than one port.

They had devoted considerable attention to the question of controlling the arrival of cargo at the loading berths so as to ensure that bottom cargo arrived first and that the total cargo was spread over the loading period so that the quantity arriving each day could be handled without difficulty.

The question of the regularisation of this traffic had been taken up with the Liverpool Steam Ship Owners' Association and the Working Party were convinced that at any rate all those shipping companies which carry large cargoes indicated at the time at which they booked the cargo, either a specific date on which the cargo should be tendered at the berth or, in the case of large consignments, a period during which it should be so delivered. In order still further to regulate the traffic they suggested to the Liverpool Steam Ship Owners' Association that when a period was indicated, a limit should be given as to the quantity to be delivered on any one day during the period.

They regretted to report irrefutable evidence that the dates indicated by the shipowner are often disregarded. On being informed that the haulier was unaware of any specified date they tried to ascertain at what point in the chain between the shipper's agent and the haulier the given date was lost. So far they have had no success in their enquiries but the matter is still being pursued.

The Report continues, " the basic principle of spreading the arrival of cargo over the loading period is fundamentally sound. The haphazard arrival of cargo even though suiting the shipper and haulier obviously leads to delay. If a wharfinger mans the quay on a certain basis having in mind the anticipated arrival of traffic and a much heavier volume of traffic arrives delay is bound to arise. The co-operation of the shipper and haulier is a prerequisite to the successful application of any system of control."

" It was felt that any attempt to impose compulsory control on all goods brought to the port for export might create complications and lead to difficulties disproportionate to the existing trouble which might well in themselves defeat the objects of the control, particularly having in mind that such trouble only affects a comparatively small number of berths for a limited period in each month. At the same time it was realised that a voluntary acceptance of a control unsupported by sanctions was extremely difficult to achieve in sufficient degree to effect substantial improvement in the present position."

" We nevertheless suggest that the Steamship Companies should continue their attempts to regulate the arrival of cargo on a

Delays to Road Vehicles at Liverpool Docks—continued

voluntary basis best suited to their individual requirements but the co-operation of all the other parties involved is essential if any such system of regulation is to operate even reasonably successfully."

The problem was still further complicated by the efforts of hauliers to obtain rapid discharge. It was found that as soon as hauliers anticipated that they might experience some delay they give instructions to their drivers to arrive at the berth before the beginning of working hours so as to be first on turn. In the result that really made matters worse and many cases had been brought to their notice where as many as 40 vehicles had accumulated at the loading berth before 8 a.m. It was inevitable that there would be considerable delay in dealing with such a number of vehicles and that difficulty could only be remedied by restoring to hauliers confidence that their vehicles would be dealt with without undue delay at any time of the day. They had considered whether it would be possible for the shipowners to specify on the shipping note not only the date of arrival but also a time, but felt that it would be impossible for long-distance traffic to comply with such detailed arrangements.

There was no doubt that a great deal of delay was caused and time wasted through the mixed stowage on one vehicle of goods destined for different ports and often for different ships. Those goods had to be sorted out on arrival at the export berths and following vehicles were held up while that additional operation took place.

The possibility of instituting additional depots at which cargo could be discharged for sorting and subsequent delivery to loading ship had been considered and was receiving the further consideration of the Port Authority, who had already taken certain action in regard to a particular berth where delays were being experienced. The question of providing the necessary accommodation was difficult but the financial problem was more serious. It was estimated that the use of an intermediate depot for that purpose would increase the cost of shipment by an amount varying according to the position of the depot and the type of cargo dealt with, from 7s. 6d. to 20s. per ton. It was appreciated that such increased cost would have a most deleterious effect upon the export trade.

Regarding the unloading of road vehicles, the custom of the port has always been that the haulier is responsible for the lightening of his vehicle at a " set " indicated by the Wharfinger. Where packages for different ports are carried on one vehicle this involves the movement of the vehicle to different sets. Cranage facilities when necessary are always made available by the shipowner and, in many cases, he also provides labour to assist in the unloading of the vehicles. This, however, is on a voluntary basis and there is no obligation on the shipowner to do so. The haulage interests have pressed for this custom of the port to be abolished and sufficient dock labour to be provided to undertake the work of unloading their vehicles, thus relieving them of this responsibility, quoting the practice at certain other ports in support of their contention.

After a thorough investigation of this point, the Working Party concluded that the best procedure is to leave the responsibility where is now lies, but to urge shipping companies to extend to the greatest possible degree the assistance which they already give voluntarily in the unloading of vehicles, especially at berths where heavy acceptances are taking place.

With regard to the shortage of mechanical aids for assisting in handling of cargo, the Working Party stated that the lack of sufficient cranage for unloading vehicles had been reported to them. At peak periods some shortage must inevitably occur but the position generally was satisfactory and should improve as the additional equipment on order by various employers becomes available. In addition the Port Authority has under consideration the possibility of increasing the mobile cranes provided by them for hire.

Attention had been drawn to the difficulties experienced both in obtaining spare parts for repairs and also in the delivery of new mobile cranes and trucks, and this matter was discussed with the Ministry of Transport Working Party on the turn-round of shipping.

In connection with this question of unloading facilities, efforts have been made to increase the use of gravity rollers, it being considered that in spite of their recognised limitations, a considerable saving in time and effort would result from the extended use of this appliance.

The Labour Problem

Complaints had been made regarding the inefficiency and indiscipline of dock labour, but this is a question which is already receiving the active consideration of the Local Dock Labour Joint Committee and National Dock Labour Board. The Working Party however " feel it necessary to point out that the inevitable result of decreased tonnage per gang hour loaded into vessels is to reduce the amount of quay space available for the reception of cargo at any time and in consequence to increase the difficulties of handling fresh arrivals expeditiously. The present day rate of loading has remained fairly constant for some months at an average of 6.9 tons per gang hour and, whilst exact pre-war figures for comparative purposes are not available, the general opinion is that the rate then was not less than 9 tons per gang hour. Taken over the whole period of the loading of a ship the importance of such a decrease in relation to the problem considered by us is very great and we propose to draw the attention of the Dock Labour Joint Committee and the Dock Labour Board to this aspect of the question."

The possibility of segregating road vehicles requiring cranage from those which are to be unloaded manually had been considered and representations made that such a procedure should be adopted wherever practicable. They had also investigated complaints that sufficient receivers were not available, but there does not appear to be any justifiable cause for general complaint on this score.

Representations were made by shippers that insufficient notice was sometimes received by them to effect delivery by the specified date. It was appreciated that circumstances might shorten the period of notice shipowners were able to give, but it was obviously important that as full notice as possible be given so that shippers could make their transport arrangements. The attention of the Liverpool Steam Ship Owners' Association and the Institute of Shipping and Forwarding Agents had been drawn to this matter.

Future Action Available to the Working Party

Regarding future action, the Working Party observe " It has admittedly not been possible to find any sovereign remedy to meet the present position and we greatly regret that many of the major suggestions to which reference is made in this Report have failed to provide the desired solution. Nevertheless, a number of suggestions have been made resulting in action in various directions which, in our opinion, are having a definitely beneficial effect on the problem. It is considered that we can continue to serve a useful purpose by pursuing a number of points already mentioned in this Report and, if possible, by securing their successful development; by keeping a check on the position and ensuring local action in special circumstances; by investigating any special complaints and making the necessary representations to the various bodies concerned with the matter. It is suggested, therefore, that we should continue to meet from time to time to keep the position under review."

In conclusion, the Report states " the publicity given to this subject by the Press naturally resulted in the receipt of a considerable number of complaints. These have been investigated and, whilst it is not desired to minimise in any way the inconvenience and expense known to have been incurred in certain instances, it is quite clear that many of the published reports have been grossly exaggerated."

" The question of the delay in the turn-round of ships and the failure of goods to obtain shipment has also been considered in conjunction with the other Companies loading from Liverpool and Birkenhead and there is no evidence whatever that any hold-up of road transport has delayed the turn-round of any ship or that a single ton of export cargo has been lost to this country from this cause. The shipowner members of the Working Party are convinced of this and this is also the considered opinion of the body of the Liverpool Steam Ship Owners, who gave evidence to this effect before the Ministry of Transport Working Party on the turn-round of Shipping."

Radar for Harbour Control

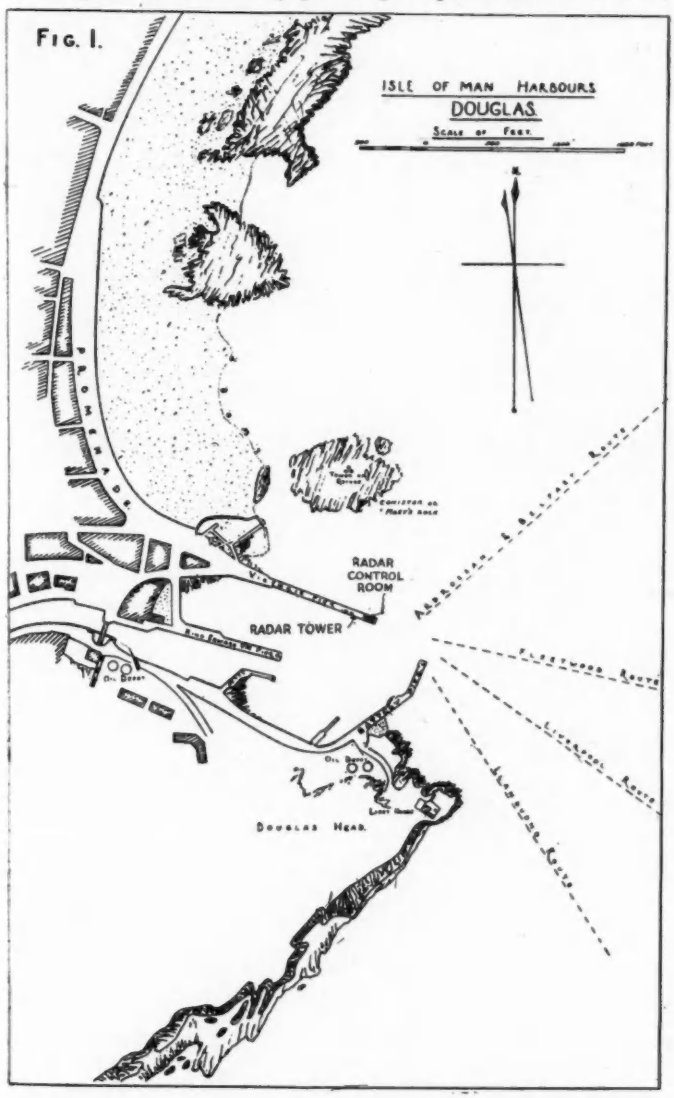
Description of Installation at Douglas Harbour, Isle of Man

By J. C. BROWN
Dipl. Eng. (University of Liverpool), A.M.I.Mech.E., A.M.I.S.E.,
Engineer to the Isle of Man Harbour Commissioners.

ON Friday, the 27th February, 1948, the Douglas Harbour Radar Station was inaugurated by His Excellency, Air Vice-Marshal Sir Geoffrey Rhodes Bromet, K.B.E., C.B., D.S.O., Lieutenant Governor of the Isle of Man.

It is understood that this harbour is the first in the world to instal modern radar equipment for the purpose of harbour control; and an eloquent tribute was paid to the importance of the occasion by the presence of so many personages representative of science,

FIG. 1.



radar development and transport. Particularly noteworthy, and appropriate to the occasion, was the presence of that fine gentleman and eminent scientist, Sir Robert Watson Watt, affectionately known to us as the Father of Radar. His contributions to the science of electronics, in peace and in war, is an epic of human endeavour.

The inauguration of the Radar Station, at Douglas Harbour, is another practical expression of the long established policy of the Isle of Man Harbour Commissioners to provide every adaptable means which may contribute to the further safety and efficiency in the movement of shipping in the harbour approaches, and within the confines of the harbour.

The Commissioners, acting under the chairmanship of His Majesty's Receiver General, are the statutory authority responsible for the administration of all the harbours of the Island, and in Douglas they are responsible for the administration of a harbour which enjoys a seaborne passenger trade equalled by few harbours throughout the world; their reason, therefore, for the pursuance of the policy referred to is indubitable.

The limitations of radar in the matter of harbour control are appreciated, and so, indeed, are its enormous possibilities. It is a highly complex electronic system; it is an instrument conceived and made by man, and the human element enters into the intelligible interpretation of the "radar picture." In this we cannot expect infallibility; but its proven practical value to navigators is beyond dispute, and, despite any revolutionary developments which may appear in the future, it is felt that procrastination in bringing such a system into operation may leave an opening for a disaster which might otherwise have been avoided.

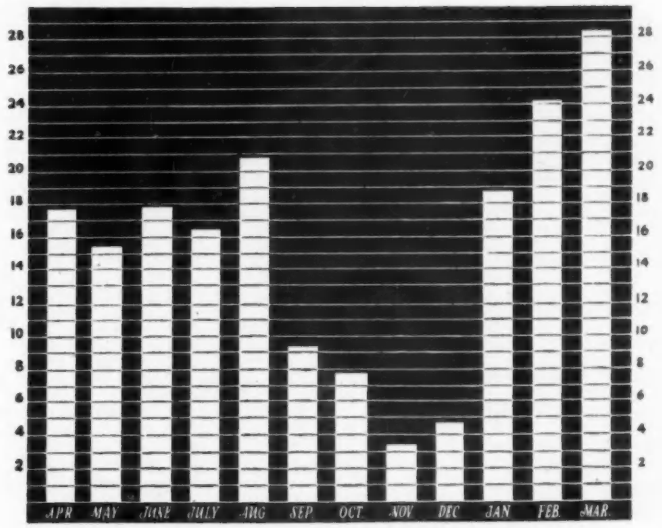


Fig. 2.—Incidence of Fog at Douglas Harbour.
Average period of fog yearly: 182 hrs. 22 mins.
Maximum for one year: 658 hrs.
Minimum for one year: 81 hrs. 50 mins.
Maximum for one month: 187 hrs. 35 mins. (March, 1942).

During periods of bad visibility, the set will operate under the personal control of the Harbour Master or his assistants, all men of considerable coastwise seagoing experience as masters of vessels. The master of an incoming vessel will be advised of the information provided on the indicator as to his location, and the movement of any other craft in the vicinity, and any other relevant information which may assist him in the navigation of his vessel into port.

It is significant that since the inception of the station, fog has persisted for many days, and the equipment has been employed with effect on several occasions in connection with shipping. It is not claimed, however, that the masters concerned would have made a less expeditious passage, nor is it claimed that they would have made less effective entry into the harbour without the aid of the service provided.

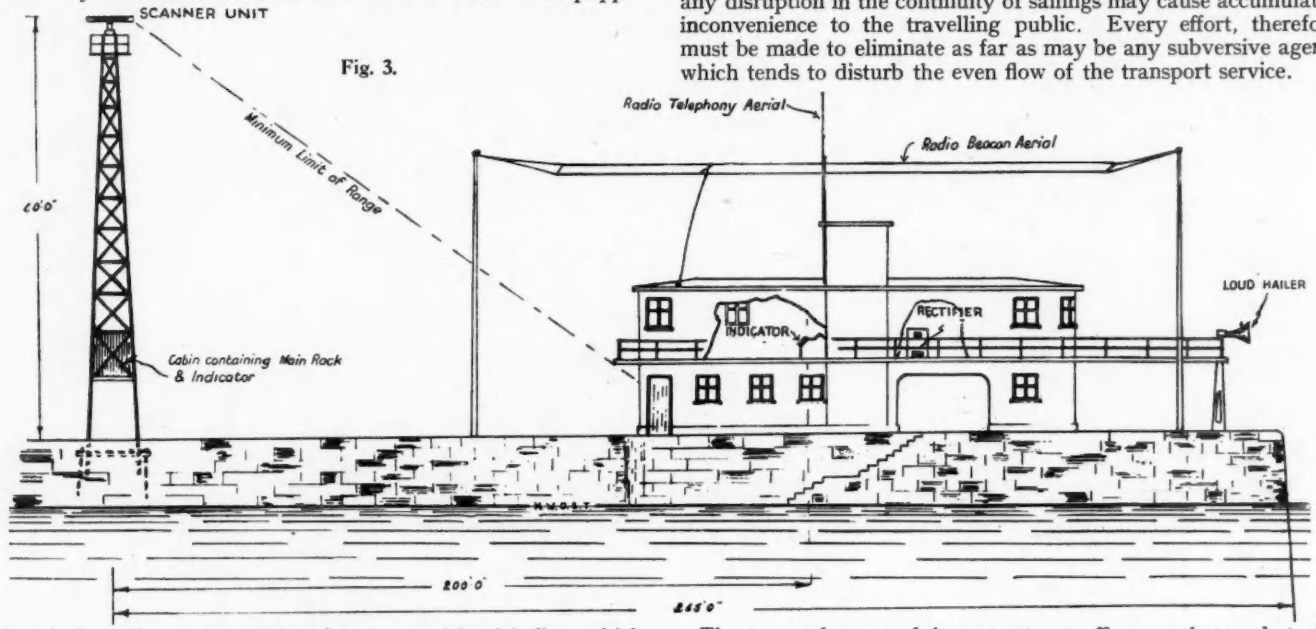
Radar for Harbour Control—continued

The consummate skill of the masters concerned is beyond doubt; nevertheless, the arrivals were to schedule, and a measure of confidence has been established between the Harbour Master and Navigator as to the efficacy of the system, and in this an objective has been attained.

Communication between shore and vessel is provided by a high frequency radio telephony system, operating on a frequency of 67.825 megacycles. Telephony is an integral part of a harbour radar installation, but at the present time the passenger vessels only are equipped for reception on this frequency. The Harbour Commissioners are not unmindful of the cargo vessels and extraneous craft which may use the port in pursuit of trade or shelter; cargo service is less spectacular, but it is their earnest desire that these vessels should benefit from the service which they freely offer.

One-way communication can be made to vessels not equipped with telephony by means of the high powered loud hailer, which is fitted at the end of the Victoria Pier; but it will be appreciated that effective range is greatly reduced, and certain conditions of adverse weather would practically nullify any advantages gained, excepting within a very limited area. A contemplation of this fact, together with an appreciation of the valuable navigational aid which is available, may constrain shipowners whose vessels regularly use the Port of Douglas to adopt the requisite telephony equipment.

Fig. 3.



Before proceeding with a general technical description of the system, a reference should be made to the features of the harbour approach, the traffic of the port and the incidence of fog. This will convey to the reader a clearer conception of the conditions which obtain at Douglas Harbour, and which were primarily responsible for this additional aid to shipping.

Harbour Approach

A reference to the accompanying plan of the harbour (Fig. 1) will show that the entrance has a north-easterly aspect. There is no estuary approach and deep water is carried well up to the coast. The entrance between the two pier heads is 470 feet in width, and the transition from open sea to harbour may be described as "abrupt." Immediately south of the entrance stands the precipitous, rocky headland of Douglas Head, and immediately northward lies a rock strewn shore. During periods of dense fog, therefore, it is an exacting process to make entry from the sea through a narrow entrance, and with such unkindly geographical features existing immediately north and south thereof. The harbour is, of course, equipped with modern and efficient audible fog signals, and, in addition thereto, a D.F. Radio Beacon operating on Victoria Pier; but despite the combined aids afforded by these, the navigator is deprived of the sense of vision, and it is in this that radar offers a vital contribution to safety of life at sea.

Traffic

The passenger traffic of the port has undergone a process of progressive development since the middle of the last century, and it has now reached a magnitude which tasks the resources of the harbour to the utmost capacity. The number of passengers embarked and disembarked at Douglas now amounts to nearly one and half million annually. During the peak of the visiting season, as many as 70,000 incoming and outgoing passengers have been dealt with in one day, necessitating the arrival and departure of over thirty large passenger-carrying vessels. Such a great influx of visitors must be handled with the utmost despatch, a task not easy of accomplishment in a comparatively small harbour, and any disruption in the continuity of sailings may cause accumulative inconvenience to the travelling public. Every effort, therefore, must be made to eliminate as far as may be any subversive agency which tends to disturb the even flow of the transport service.

The preponderance of the passenger traffic over the goods traffic is noteworthy. There is practically an inert export trade against a comparatively large import trade, consequent to a large extent upon the flow of visitors to the Island. Both trades, however, involve the entry of over 2,000 vessels annually, a little more than half of which are passenger vessels. The Isle of Man is deplorably lacking in industries of a permanent and stable nature, and the prosperity it enjoys has been determined fundamentally upon the "seasonal visiting trade"; it is essential, therefore, that every means should be provided for the safe conduct of this trade.

Fog Incidence

Fortunately, Douglas does not suffer from both sea and land fogs. It is the "Sea Fog" which, from time to time, clings to our coastline and worries our shipping. For the most part, it is local in character and not infrequently extends only to a distance of three to five miles from the coast. Of the various points about the coast, for which records are available since the year 1885, Douglas is listed second for fog persistence. From the accompanying diagram (Fig. 2), it will be observed that, unfortunately, the peak of the average fog periods are coincident with the peak periods of the seasonal traffic, and in this respect it is particularly troublesome during that season when the trade of the harbour, and the associated transport, assumes a state of amazing activity. The requirement of radar, then, to assist in combating this hazard, is to provide coverage over the harbonr approach for a distance of three to four miles from the entrance.

General Layout

In arranging the general layout of the equipment (Fig. 3), the first problem—and, indeed, the most vital one—arose in determining the best location for the Scanner. The efficiency of the whole

Radar for Harbour Control—continued

system centred on this problem, and it was given full consideration from engineering and nautical aspects; the aim being to obtain an unrestricted scan of the water within the defined limits of the harbour, together with the harbour features and sea approaches. A theoretical position was selected 60 feet above the deck of the pier, 265 feet landward from the end of the pier and 8 feet distant from the south side thereof. A practical check on theory was

Capt. H. Doran, Harbour Master, talks to an incoming vessel detected on the Radar screen, while Mr. J. C. Brown, Engineer, plots the vessel's course.

made by enlisting the services of a fire engine escape from the Douglas Corporation Fire Service, whereby each of those concerned was projected into space, at the end of the telescopic escape, to the predetermined position. The range of vision obtained in this way gave the necessary measure of assurance that the selected point was a satisfactory one. In siting the Scanner, provision had to be made for a condition of fog arising when the two outer berths were occupied by two of the largest vessels using the port, at high water of a full spring tide. Under such a condition, the superstructures of the vessels would tower above the deck of the pier, and the Scanner height had to be sufficient to clear the top of the smoke stacks.

The whole of the activity of the harbour is controlled by the Harbour Master from the Control Building at the pier head. It was decided, therefore, that the Indicator be established in this building, that it may be personally operated by the Harbour Master. This decision involved the siting of the Scanner Tower on the Victoria Pier, since there is a restricting limit to the distance between the Indicator and the Main Rack, which normally should be situated directly below the Scanner.

Scanner Tower

The work on the construction of the Tower, the cable ducts and the preparation of the Control Room, was commenced on 5th January, 1948. The design and construction was carried out by the Harbour Commissioners' staff.

The Tower is of steel lattice construction, and, by virtue of the exposed position, it is robust in design. It measures 60 feet in height, 7 feet 6 inches square at the base, and tapers uniformly to 2 feet 3 inches square at the top. A platform is constructed 2 feet below the top to provide means for attending to the Scanner mechanism. Access to the platform is made from an iron ladder built within the framework of the structure. The Tower is mounted upon a steel grillage, set 2 feet below the surface, and this grillage is anchored by a series of 2-in. diameter bolts, each 6 feet long, grouted into the solid concrete of the pier.

During the peak of the visiting season, the deck of the pier is used to full capacity, and for this reason the base of the structure was designed of Portal frame construction to span one of the passage-ways without causing any interference with the use of the passage as hitherto.

A sheet steel cabin is incorporated in the structure for the purpose of housing components, which are referred to later.

Control Room

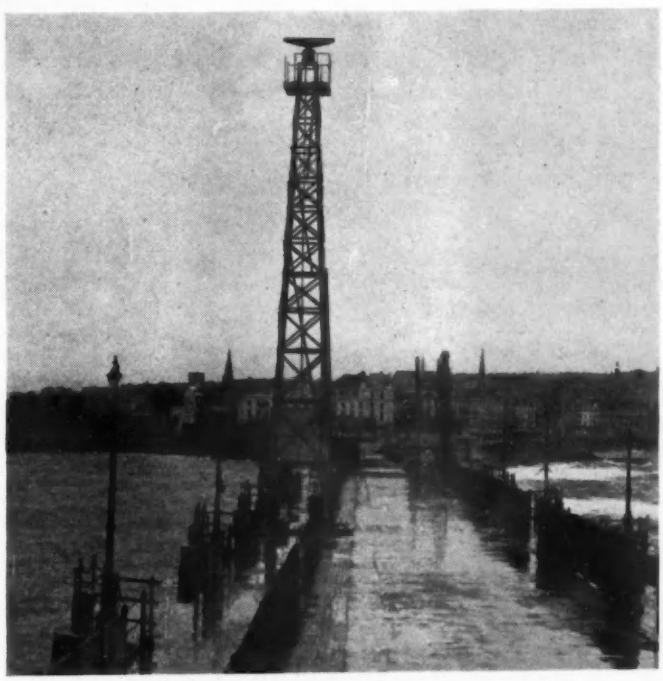
The Control Room is situated in the pier head building. It has a floor area of 18 feet by 8 feet. It has been reconstructed with double panel walling to eliminate, so far as possible, extraneous noises, and it can be readily darkened when the set is in operation. The Indicator is incorporated in a specially designed mahogany desk, and inclined at a suitable angle for " viewing " when the operator is in a seated position. The telephony loud speaker and microphone, together with the "Loud Hailer" microphone, are fitted in a convenient position on the desk.

Electrical Supply

The supply on the harbour mains is 230/460 volts, 50 cycles, single phase A.C. A 220 volt D.C. supply is required for the set, and this is provided by the installation of a Mercury Arc Rectifier, with 460 volt single phase input, and 230 volt D.C. output, with full wave rectification.

Radar Equipment

The contract for the supply and installation of the Radar Equipment proper was entrusted to Messrs. Cossor Radar, Ltd., Highbury, London.



View of Radar Tower, looking from seaward.

The set comprises four compact units:—

(1) The Indicator, on the panel of which is the screen of the Cathode Ray Tube. On the screen appears a " radar chart " of the surrounding area, and, by means of a rotating hairline cursor, scaled off in sea miles, working in conjunction with a circumferential degree scale, the distance and bearing of any vessel seen on the screen can be readily determined.

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Radar for Harbour Control—continued

(2) The Main Rack, which contains four units:—
  (a) Transmitter (working on 3 cms. wavelength) and receiver.
  (b) Modulator for driving the transmitter.
  (c) Power Pack for supplying and controlling the various potentials derived from the 500 cps. alternator.
  (d) Lock unit generating various pulses required.

(3) The Scanner, a parabolic reflector mounted on a main casting containing a D.C. driving motor, gear train and a mag slip, by means of which the time base line on the Indicator is made to rotate in synchronism with the Scanner.

(4) The Motor Alternator, 220 volts D.C., with input of 500 cps. A.C. at 180 volts.

The Main Rack and the Alternator are housed in the cabin which is incorporated in the Tower Structure. For electrical reasons, the Main Rack should be reasonably near the Scanner, a waveguide run of not more than 70 feet being advisable. In the present installation, therefore, the Main Rack is very suitably placed, in sa far as it is fitted directly beneath the Scanner, allowing for perfectly straight waveguide alignment. It is felt that this feature has contributed considerably to the good quality of the picture shown on the screen.

The set has been designed to give the various ranges suited for the particular operation at Douglas. The general requirement in this respect is for short range and large detail rather than the converse. A vessel making Douglas can employ the use of the D.F. Beacon to within 4 miles from the harbour, thereafter she can be taken over by radar for near approach and entry. To provide the most efficient coverage for this, the set can be operated on displays of 3, 1.2 or .8 nautical miles radius; the corresponding scales being 1 inch to the mile, 3 inches to the mile, and 4½ inches to the mile. In practice, an approaching vessel is located on the long range, and, as it approaches the harbour, it is traced through the 1.2 range and eventually guided into harbour on the .8 range, which offers the largest scale plan of the quays and piers. On the latter, the harbour features are clear and well defined, and when a vessel is shown entering port, distances as short as 60 feet can be estimated with remarkable accuracy.

It is to be placed to the credit of Messrs. Cossor Radar, Ltd., that, despite the exacting conditions imposed by controls and shortages, the set was brought into operation on the specified date.

It would be improvident, in view of limited experience, to indulge in firm expressions of opinion on radar in relation to harbour control; but the initial experience gained, limited though it may be, has made a deep impression on the Harbour Authority and navigators concerned as to its intrinsic value in this connection.

In the prosaic science of engineering there is little time or place for romance or legend, but it is sometimes refreshing to search for them and depart from technicalities awhile. The author, then, may be forgiven this departure and be permitted to conclude in lighter mood.

There is a legend in the Isle of Man, one handed down through the centuries, which tells us about the Sea God, Manannin. It is recorded that "Manannin kept by necromancy the Land of Mann under mist." Apparently he clothed the Island in a mantle of fog in order to protect its inhabitants whenever enemies approached the coast.

We seek aid from radar to beat the hazards of fog, but it would be deplorable, nevertheless, were radar to be employed to frustrate the benign activities of Manannin, the God of the Sea.

Radar Port Approach

The Influence of the Scale of Radar Pictures on the Spacing of Reflector Buoys to form Characteristic Radar Patterns

By CAPT. E. M. ROBB, M.I.N.

In an article on radar in the "Journal of Commerce Annual Review," the present writer described how spot size, beam width and pulse length combined to define the size of the "paint-brush" used to paint the picture on a radar screen. Subsequently it is shown that determination of the distances separating individual buoys of a closely-spaced pattern requires knowledge of the smallest natural scale of P.P.I. picture on which the pattern should become recognisable, and the range at which the group must be recognised.

The series of natural P.P.I. scales advocated by the writer was adopted in the initial Performance Specification for Merchant Ship Radar. In the specification as revised in November, 1946, the fixed series of natural scales was abandoned and manufacturers were permitted to use scales which, under full analysis, gave them almost complete freedom of choice—provided the "x3" principle in the size of the steps between scales was roughly adhered to.

From experience gained during January, 1946, when H.M.S. *Pollux* first experimented with, then demonstrated radar in the Thames Estuary, the definite conclusion was formed, that small groups of radar reflector buoys laid in simple geometrical designs afforded characteristics which ensured instant recognition; and that major assistance to radar navigation would be provided, by the judicious establishment of such groups, in a restricted waterway which failed to provide natural targets suitable for recognition on the P.P.I. with a scale in use appropriate to the requirements of navigation.

When assistance to radar navigation is contemplated, it would appear that the first requirement of a navigation authority is a knowledge of what it will have to contend with in radar presentation. The departure from a fixed series of P.P.I. scales is a step which will not facilitate the deliberations of the shore authority, and it is suggested that this aspect should be considered by authorities before further revision of the specification is completed.

The adoption of any system of widely-spaced reflector buoys to form patterns will be eminently suitable when there are few ships about, but should a momentary concourse of shipping reach any great density, the buoys of a widely-spaced pattern might lend themselves to confusion.

A tight scale requirement in an official performance specification might be circumvented to a small extent by the production of radar sets with a resolution exceeding that required by the specification.

SITUATIONS VACANT.

These advertisements do not relate to men between the ages of 18 and 50 inclusive, unless excepted from the provisions of the Control of Engagement Order, 1947, or the vacancies are for employment excepted from the provisions of that Order.

DREDGE MASTER required for abroad for operation of 16-in. Diesel Electric Cutter Suction Dredge and Floating Discharge Line. Applicants should be experienced operators and able to handle native crew. An engineering apprenticeship and experience of mechanical and electrical repairs will be considered an asset. Free furnished quarters and medica attention. Salary and allowance total £1,200 per annum gross, les income tax £75 per annum. Write: Box 321, c/o Judds, 47, Greshar Street, London, E.C.2.

CIVIL ENGINEER required to take charge of section of large contrac abroad, including canal excavation by dredger and large concrete head regulator. Applicants should have experience of cutter suction dredger operation, and mass concrete work. Corporate Membership of Inst.C.E. or equivalent desirable. Age about 30 to 45. Total remuneration, including allowances, £1,500 per annum, less Local Income Tax approximately £110. Free furnished quarters and medical attention provided. Write: Box 367, c/o Judds, 47, Gresham Street, London, E.C.2.

ASSISTANT CIVIL ENGINEER required for large contract abroad; duties will include surveying, setting-out, measurements and some supervision; applicants should have Sections A & B of the Inst.C.E., or equivalent, and have had 2 or 3 years' field experience with Public Works Contractors. Remuneration £80 per month, less Local Income Tax approximately £60 per annum. Free furnished quarters and medical attention provided. Kit allowance. Write: Box 374, c/o Judds, 47, Gresham Street, London, E.C.2.